IMT Institute for Advanced Studies, Lucca

Lucca, Italy

Two Essays on Institutions and the State in Russia

&

A Study of Absorptive Capacity

PhD Program in Economics, Markets, Institutions

XXIV Cycle

By

Michael Rochlitz

2013

The dissertation of Michael Rochlitz is approved.

Programme Coordinator: Davide Ticchi (IMT Lucca)

Supervisor: Andrea Vindigni (IMT Lucca)

Tutor: Mark Dincecco (IMT Lucca)

The dissertation of Michael Rochlitz has been reviewed by:

Mark Dincecco (IMT Lucca)
Cristina Tealdi (IMT Lucca)
Davide Ticchi (IMT Lucca)

IMT Institute for Advanced Studies, Lucca

2013

Table of Contents

List of Figures

List of Tables

Acknowledgements

I want to thank my supervisor Andrea Vindigni for his supervision, and Anne Brockmeyer, Randolph Bruno, Natalia Davidson, Rachel Doern, Giovanni Dosi, Phil Hanson, Alena Ledeneva, Francesca Lotti, Tomasz Mickiewicz, Massimiliano Onorato, Gérard Roland, Peter Rutland, Cristina Tealdi, Tom Weyman-Jones, Andrey Yakovlev, two anonymous referees and especially Mark Dincecco for many helpful comments and support. I also want to thank the organizers and participants of the workshops, summer schools and conferences where I had the chance to present parts of this dissertation. Their comments and suggestions have been most valuable.

Special thanks goes to my co-author, flat- and conference-mate Letizia Montinari (with whom chapter 4 of this dissertation is a joint work), and to my fellow students Begum Cimen and Giovanni Marin here at IMT, who helped me a lot with the coursework and various econometric problems.

I also want to thank Liudmila Ruzhanskaya and Dasha Kurbatskaya for inviting me to Yekaterinburg, and for their help and kindness during my various research stays at Ural Federal University.

Finally, a big thanks goes to my parents and my sister for their support and encouragement throughout the PhD, and to our cat in Yekaterinburg, who every day sat under the lamp next to my computer when I was writing up the thesis.

Vita

August 14, 1981	Born, Sindelfingen, Germany
2001	Abitur, Schönbuch Gymnasium Holzgerlingen, Germany
2001-2002	Civil Service, IME "Les Fontenottes", St. Julien du Sault, France
2002-2007	MA Development Studies, Sciences Po Paris, France
2007-2008	MSc Development Economics, School of Oriental and African Studies, University of London, UK
2010-2011	Visiting researcher, School of Slavonic and Eastern European Studies, University College London, UK
2012-2013	Visiting lecturer, Ural Federal University, Yekaterinburg, Russia

Presentations at Conferences, Workshops, Summer Schools and Seminars

2013: 2nd Russian Economic Congress, Suzdal, Russia; 14th International Academic Conference on Economic and Social Development, Higher School of Economics, Moscow; Research Seminar, State University - Higher School of Economics, Perm branch, Russia; Research Seminar, Nazarbayev University, Astana, Kazakhstan; 1st Annual Xiamen University International Workshop on Economic Analysis of Institutions, Xiamen, China; CSID conference on Institutions and Development in Russia, Higher School of Economics, Moscow

2012: Coase Workshop on Institutional Analysis, Beijing; 20. Tagung Junger Osteuropa-Experten, Tutzing, Germany; Russian-Sino Joint Conference, Yekaterinburg, Russia

2011: EACES-HSE PhD seminar, 12th HSE International Academic Conference, Moscow; 8th International Conference on the Development of Russian Regions, Yekaterinburg, Russia; Soviet Legacies Summer School in Ostroh, Ukraine; Changing Europe Summer School, Higher School of Economics, Moscow

2010: BASEES Conference, Cambridge, UK; EBES 2010 Conference, Istanbul; 8th ICCEES World Congress, Stockholm; 10th World Congress of the Econometric Society, Shanghai

Publications, Working Papers and Book Reviews

- Industrial Policy and State Capacity: A Comparative Analysis of China and Russia (forthcoming, in Chinese, in *Studies of Development Economics*, Economic Science Press, Beijing)
- Absorptive Capacity Compared: Evidence from Sectoral Data (together with Letizia Montinari), IMT ECI working paper No. 4, ISSN 2279-6894
- The Political Economy of Industrial Policy in Putin's Russia (working paper)
- Elections vs. Appointments: Comparing Incentive Patterns for Russian Governors under Putin (working paper)
- Corporate Raiding and the Role of the State in Russia (working paper)
- Book review of Vogel E. (2011), *Deng Xiaoping and the Transformation of China*, Europe-Asia Studies, submitted
- Book review of Wright T. (2011), *The Political Economy of the Chinese Coal Industry*, Europe-Asia Studies, forthcoming
- Book review of Samuelson L. (2011), *Tankograd: The Formation of a Soviet Company Town: Cheliabinsk 1900 - 1950*, Europe-Asia Studies, 65(4), 779-800
- Book review of Fu X., Soete L. (2010, eds.), *The Rise of Technological Power in the South*, Journal of Economic Issues, 46(4), 1093-1094
- Book review of Mendras M. (2012), *Russian Politics: The Paradox of a Weak State*, Political Studies Review, 12(1)
- Book review of Florini A., Lai H., Tan Y. (2012), *China Experiments: From Local Innovations to National Reform*, Political Studies Review, 11(3)
- Book review of Breznitz D., Murphree M. (2011), *Run of the Red Queen: Government, Innovation, Globalization, and Economic Growth in China*, Frontiers of Economics in China, 7(3), 496-498
- Book review of Xuetong Y. (2011), *Ancient Chinese Thought, Modern Chinese Power*, Political Studies Review, 10(3), 467
- Book review of Lonkila M. (2010), *Networks in the Russian Market Economy*, Europe-Asia Studies, 64(5), 964-965

Abstract

Chapter 1 presents a short introduction to Russia's economy in 2013, showing that the country has become more dependent on natural resource exports during the last 15 years, despite attempts by the Russian state to diversify the economy. I then undertake a short comparison of industrial policy and institutions in Russia and China. I argue that two reasons why China has been more successful than Russia in implementing industrial policy and diversifying its economy is the country's pro-growth incentive structure, and its focus on absorbing technology from abroad.

Chapter 2 studies the change in incentives faced by Russian regional governors, after gubernatorial elections were replaced by presidential appointments in 2004. Using an ordered probit model, the chapter examines how various measures of economic performance and political loyalty affect the probability of Russian regional governors to stay in office. While before the 2004 reform, the likelihood to stay in office seems not to depend on political loyalty to the centre, after the reform election results for the president and the Kremlin party play a strong and significant role in explaining the likelihood of regional governors to stay in office, while economic performance has a negative effect. I interpret these results as evidence that after the reform in 2004, the ruling elites in Moscow started using appointments of regional officials to consolidate their political control over the country, while performance-related criteria play only a secondary role.

Chapter 3 presents a novel dataset containing 312 cases of illegal corporate raiding (reiderstvo) that took place between 1999 and 2010 in Russia, assembled through a comprehensive scan of Russian national and regional newspaper archives. Analysing the dataset, I am able to identify a shift in both the regional and sectoral distribution of raiding cases over time, as well as an increasing involvement of state agencies in illegal raiding attacks. Using a fixed-effects panel model, I find that regional election results for the ruling president and his party, as well as the degree to which elections are manipulated throughout Russia's

regions, are significantly and positively correlated with the number of raiding cases in a given region. I also find that regions in which governors have stronger ties to their region suffer from a lower degree of attacks. A possible interpretation of these results is that under Russia's new authoritarian electoral regime, the centre tolerates a certain amount of rent-seeking and predatory activities by regional elites, as long as these elites are able to provide a sufficiently high level of electoral support for the centre. I further argue that the results concerning the local attachment of regional governors can be seen as evidence confirming Mancur Olson's theory on stationary and roving bandits.

Chapter 4 (written together with Letizia Montinari) investigates differences in and determinants of technical efficiency across three groups of OECD, Asian and Latin American countries. In the literature, the kind of technical efficiency we examine is seen as one of the main factors influencing the ability of a country to absorb technology from abroad. Using a stochastic frontier framework and data for 22 manufacturing sectors for 1996-2005, we find notable differences in technical efficiency between the three country groups we examine. We then investigate the effect of human capital and domestic R&D, proxied by the stock of patents, on technical efficiency. We find that while human capital has always a strongly positive effect on efficiency, an increase in the stock of patents has positive effects on efficiency in high-tech sectors, but negative effects in low-tech sectors.

Chapter 1

Introduction[1]

1.1 Russia in the World Economy

22 years after the end of the Soviet Union, and 15 years after a period of serious economic decline, the Russian Federation has re-emerged as one of the world's biggest economies. At the beginning of 2013, Russia was the eight largest economy in the world by nominal value, and the sixth largest by purchasing power parity[2].

As the host of the 2014 Winter Olympics in Sotchi and of the FIFA World Cup in 2018, as well as a member of the *BRIC* group of emerging economies, Russia has also regained much of the international standing it lost during the chaotic decade of the 1990s.

However, a closer look at the performance of the Russian economy during the last 15 years reveals that the country is actually facing a number of problems that make its future look much less promising than that of many other emerging economies. A recent report by the European Bank of Reconstruction and Development shows that the Russian economy today is actually less diversified and more dependent on oil and gas exports than it was 15 years ago (figure 1.1, EBRD 2012), despite numerous policy initiatives by the Russian government to foster economic diversification and modernization during the last decade[3].

---

[1] In parts, this introduction is based on Rochlitz (2012).

[2] CIA World Factbook (2012)

[3] Examples are the re-grouping of various industries into large, state-controlled holdings (the so called "state-corporations"), the attempt to create innovation clusters (such as the innovation project Skolkovo near Moscow, the science town Dubna, or the innovation cluster "Titanium Valley" near Yekaterinburg), and the attempt to build frontier innovation capacities in high-technology sectors such as nanotechnology.

Figure 1.1: Share of Russian oil and gas in selected economic indicators
Graph from EBRD (2012, page 14); data sources: US Energy Information Administration, IMF, Russian Finance Ministry, Rosstat.

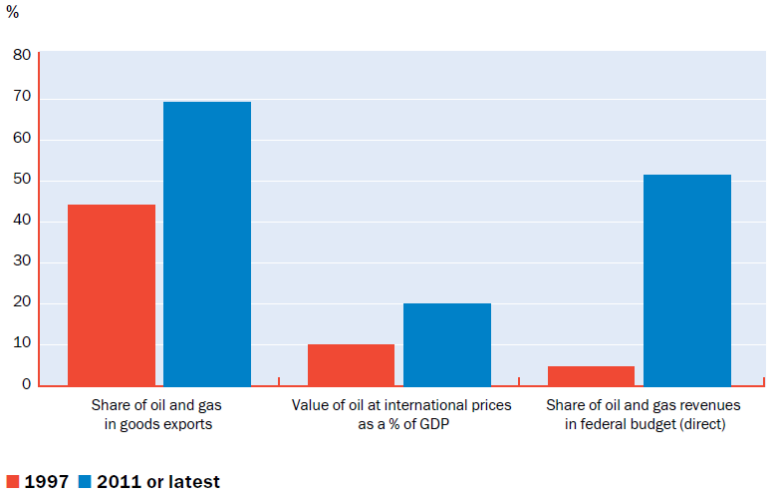
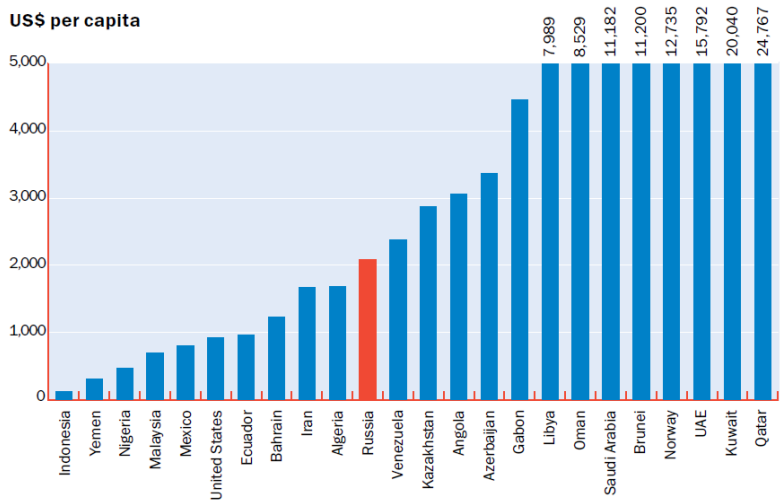
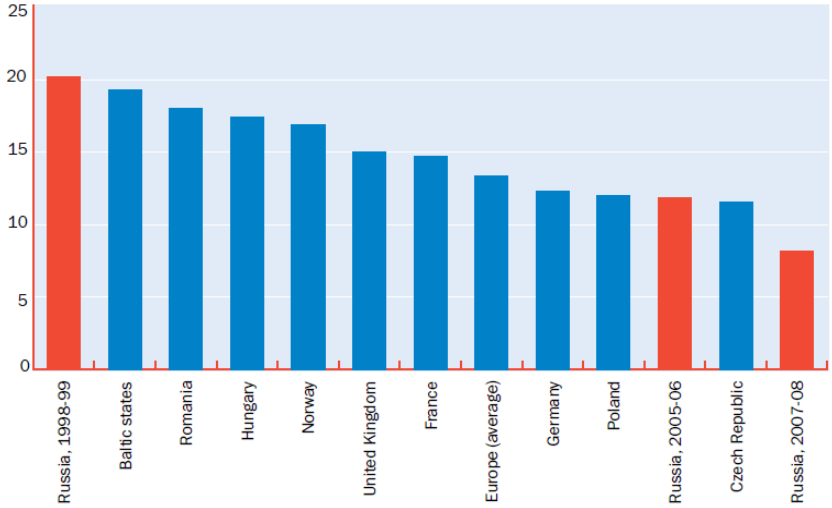


Figure 1.2: Value of oil produced per capita in 2010
Graph from EBRD (2012, page 16); data sources: US Energy Information Administration, IMF; selected countries only; oil valued at international prices.



As the *per capita* value of natural resources produced in Russia is not exceptionally high in international comparison (see figure 1.2, EBRD 2012), and as resources will last only for another 20 years at current rates of extraction (EBRD 2012, page 16), the inability of the Russian economy to structurally change and open up new fields of comparative advantage might put the country's current levels of income per capita and its current position in the world economy at risk in the not too distant future.

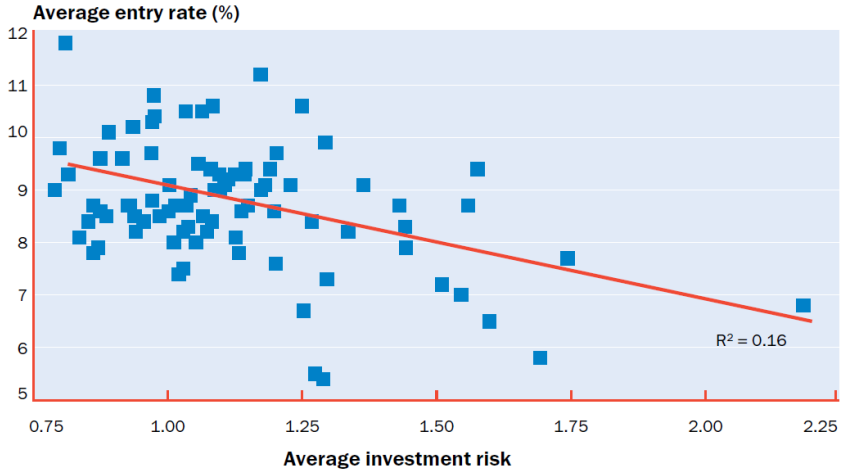
Figure 1.3: New firms as a % of total firms
Graph from EBRD 2012, page 32; data sources: Klapper et al. (2006), Bruno et al. (2011); based on 1998-1999 data, unless otherwise indicated; "new firms" are companies in their first or second year in business.



It would therefore be imperative for Russia to use its current window of opportunity, made possible by high oil prices and still extensive natural resource reserves, to develop new capabilities and competitive industries in various sectors throughout the country. However, instead of diversifying and modernizing, the Russian economy seems actually to have become less dynamic over time. For example, firm entry rates have been consistently declining over the last decade. While at the

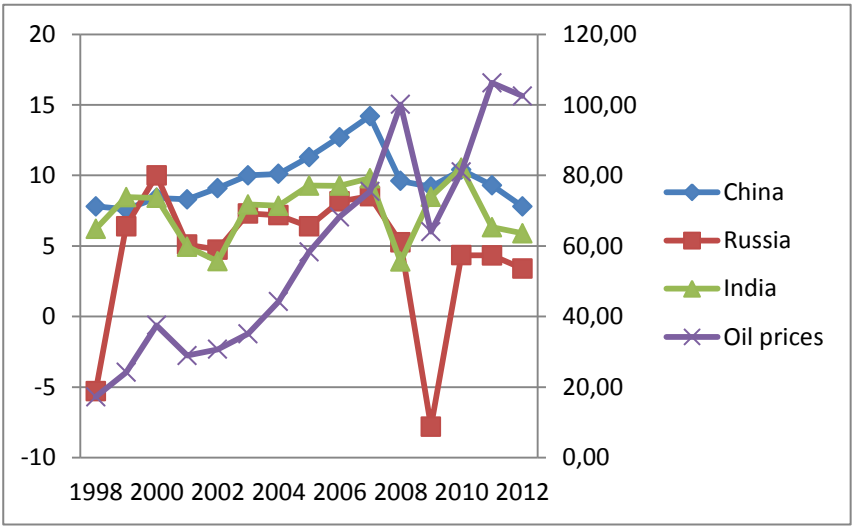
beginning of the 2000s, firm entry was higher in Russia than in many other transition or Western European countries, by the end of the decade entry rates had become much lower than in other countries (figure 1.3, EBRD 2012), with the low quality of regional institutions being one of the main determinants of low entry rates (figure 1.4, EBRD 2012).

Figure 1.4: Russian regions: firm entry and institutional environment (1996 – 2008) Graph from EBRD 2012, page 32; data sources: Bruno et al. (2011), Expert Rating Agency; higher levels of investment risk corresponding to a more difficult business climate.



Russia's lacking economic dynamism during the last decade becomes especially apparent once we compare the country to other emerging economies. Looking at GDP growth rates for the BRIC countries, we see that after 8 years of relatively high growth rates between 1999 and 2007, Russia's growth has been trailing off since 2008, especially with respect to China and India, even though oil prices have soon reached pre-crisis levels again (figure 5).

Figure 5: GDP growth rates for Russia, China and India (1998-2012) / Real Oil Prices Left y-axis: annual GDP growth rates in %; right y-axis: annual average imported crude oil price to the US; Data sources: World Development Indicators; US Energy Information Administration

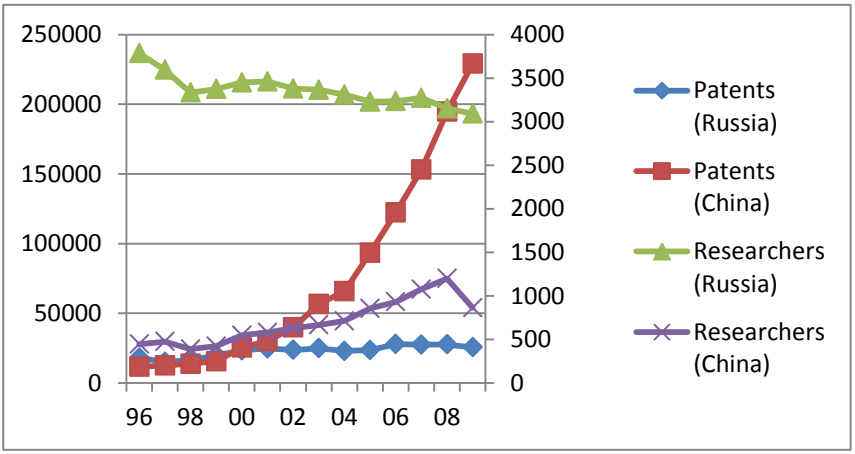


If we then look more in detail on a number of specific aspects of the Russian economy, such as Russia's manufacturing sector, science & technology or the development of infrastructure in Russia, we see why growth during the first decade of the 2000s was mainly driven by high international oil prices, rather than by more fundamental characteristics of the Russian economy.

Comparing Russia with China is particularly striking in this respect. For example, while China has managed to build a couple of competitive manufacturing industries from scratch during the last 15 years (e.g. in the automobile, aircraft and high-speed railway sector), often with the help of aggressive industrial policies (McGregor 2010, Heilmann and Shih 2013), market shares for Russian manufacturing industries in the same sectors have been constantly declining over time, despite similar support by the Russian state (Rochlitz 2009, 2012).

Comparing the science and technology sector (S&T) in both countries is equally illustrative. While Russia still has a quantitatively very important research and innovation sector (if measured by the number of researchers per capita), the general quality of research, as well as the output of high-quality research produced in Russia is relatively low, and has been stagnating over time (figure 6).

Figure 6: Patent Applications / Number of Researchers for Russia and China Left y-axis: Patent applications by residents; right y-axis: number of R&D researchers per million residents; data source: World Development Indicators



Apart from patent filings, during the last 15 years China has overtaken Russia with respect to a number of further S&T indicators, such as R&D expenditure as percentage of GDP, publications in peer-reviewed journals, university rankings, the number of students abroad, or the percentage of international students in national universities. For example, between 1998 and 2008 the annual number of publications in peer-reviewed journals has increased by 400% to 112000 in China, while in Russia it has stagnated at a level of about 20 000 (Balzer 2011, pages 4-10).

China has also been more successful than Russia "in fostering university-based R&D, developing university linkages with industry, integrating its universities with the global higher education sector, and encouraging talented co-nationals to return home" (Balzer 2011, page 2). Interestingly, China has achieved all this despite starting from a much lower base of science and education resources.

Finally, comparing the development of infrastructure in both countries provides us again with a similar picture. While China has developed its infrastructure at high speed, not much has happened in terms of infrastructure development in Russia during the last 15 years.

For instance, the Chinese government has pushed forward an ambitious program of high-speed rail construction, with 13000 km of new lines for bullet trains due to be completed by 2012 (Bradsher 2010). Air- and sea-port capacity in the country has been expanding rapidly, while China has also recently constructed 53600 km of new expressways, making the country's expressway system the second largest in the world after the one of the US[4] (Bai and Qian, 2010).

During the same time span, the total length of paved roads in Russia actually declined from 750 000 km to 700 000 km, mainly because of insufficient funds allotted to road maintenance (Nemtsov and Milov 2008). Nemtsov and Milov argue that this has been a consequence of the federal road funds being abolished in the year 2000, with Pynnöniemi (2008) maintaining that this abolition resulted in the decline of the share of road investment relative to GDP from 3% in 2000 to 1% in 2007.

Looking on Russian railways, the picture is similar. Although plans to build a high-speed train link between Moscow and St. Petersburg (the first such link in Russia) exist since the early 1990s, the starting date for construction has continuously been postponed, with completion now

[4] The Economist (14.02.2008), *China's Infrastructure Splurge: Rushing on by Road, Rail and Air*.

being projected for 2018[5]. Plans for a high-speed train between Moscow and Yekaterinburg have been shelved after several years of preliminary planning[6]. Although state-owned *Russian Railways* have repeatedly announced substantial long-term investment plans, much of current investment spending is used to keep the existing system working, instead of expanding capacity, despite constantly growing demand. The only notable exception are investments in Sochi for the Winter Olympics in 2014, although these investments arguably do not respond to the core needs of the Russian economy[7].

Most airports in Russia are badly in need of modernization, with only two (Domodedovo and Sheremetyevo) having been certified as third category by the International Civil Aviation Organization in 2010 (third category meaning that an airport has the equipment to let planes land safely even in zero visibility conditions)[8]. Finally, those infrastructure investments actually occurring seem often to be more of a prestige nature than responding to actual economic needs, such as the costly bridge and conference centre constructed on a sparsely inhabited island near Vladivostok, for the APEC summit in 2012.

A general feature seems to be that while officials in China announce the successful completion of projects, officials in Russia announce the start of investment and construction projects for the near future, with the projects then losing steam or being scaled down. Especially Russia's newly established state corporations seem to be rather inefficient in implementing infrastructure modernization, investment and innovation projects (Sprenger 2010, Kessler and Levin 2012, Gershman 2013), while at the same time local governments in China outcompete each other with investments into infrastructure (Qian and Roland 1998, Zhang 2011).

---

[5] pravda.ru, (29.04.2011), *From Moscow to St. Petersburg in 2.5 hours*.

[6] Delovoi Kvartal, (24.09.2012), interview with Aleksei Bagariakov, dkvartal.ru

[7] emg.rzd.ru, Investment Programmes, (http://eng.rzd.ru/statice/public/rzdeng?STRUCTURE_ID=294&)

[8] CBS News, 26.04.2010, Polish Crash Shows Russia's Crumbling Airports (http://www.cbsnews.com/2100-202_162-6391139.html)

1.2 Institutions and Incentives

Why is Russia performing so much worse than a number of other, comparable emerging economies? A number of renowned Russia-watchers have attributed Russia's recent lower growth rate to the country's deficient institutional system, arguing that it is likely that the country's growth rate will stabilize somewhere around 3% to 4% or lower during the next couple of years, if no significant institutional reforms are undertaken (see e.g. Hanson 2012).

The argument I make in this dissertation goes into a similar direction. I argue that the way Russia's current institutional system is organized makes it difficult for the Russian state to successfully carry out the kind of industrial policies Russia has tried to implement during the last couple of years. I further claim that Russia's failure to achieve tangible results in the sphere of innovation, science & technology and infrastructure is also related to the way the country's institutions are working. An especially important role in this respect is played by the incentives faced by bureaucrats and state officials.

An extensive literature has examined why industrial policy has been successful in some contexts, and not in others. In a nutshell, the aim of industrial policy is to give domestic companies the necessary time to learn and become competitive on world markets.

However, for subsidies to work, a subsidy-receiving company in an infant industry, or in an industry experiencing economic transition, has to face strong incentives to become competitive as soon as possible. Promoting competition among subsidy recipients, enforcing sunset clauses or putting a requirement in place to start exporting after a certain time period are crucial in this respect. Therefore, key requirements for industrial policy success are the capability of a state to discipline recipients of subsidies and learning rents, to credibly enforce sunset clauses, and to foster necessary levels of competition (Khan and Jomo, 2000).

To be able to successfully administer such policies, bureaucrats and state officials must be embedded enough with local companies to be able to make informed choices (1), but sufficiently autonomous and motivated (2) to avoid being captured by businesses that want to extend the payment of subsidies beyond a time span economically sensible (Evans 1995). A number of authors have argued that it was exactly because such conditions of *embedded autonomy* where in place in Japan, Taiwan or South Korea from the 1960s to the 1980s that these countries were able to catch up economically to the West (Johnson 1982, Amsden 1989, Wade 1990).

In this dissertation, I argue that Russian bureaucrats lack this second crucial ingredient (autonomy / motivation) to make industrial policy work in the country. While Russian state officials are generally well educated and most probably informed enough about the kind of policies they should be implementing to make industrial, infrastructure and technology policies work[9], they face the wrong incentives to implement and enforce these policies.

As I show empirically in chapter 2 for Russian regional governors, instead of being rewarded for creating economic growth in their respective district, city or region, Russian officials are rewarded for delivering *political support* to the ruling elites in the federal centre. In other words, the mayor of a town where an important innovation project fails to produce expected results will probably not be fired because the project failed. However, if during the next Duma elections the Kremlin party *United Russia* fails to come up first in his city, the mayor's chances to keep his job are slim. As a result, the mayor will probably rather continue to pay subsidies to the town's factory and turn a blind eye on lacking progress in the innovation project, as long as the factory director promises to convince his employees to vote for the Kremlin party during the next elections (see Frye, Reuter and Szakonyi 2012 for an analysis of voter mobilization in Russian factories,

[9] For example, Frye, Reuter, Buckley (2011) show that governors appointed during recent years were better qualified than their predecessors, with many holding university degrees in economics.

and the role played by local mayors and regional governors in this respect).

As a result, the significant sums of money pumped into innovation and modernization projects every year by the central Russian state produce unsatisfactory results, as local officials are not sufficiently motivated to enforce performance criteria or sunset clauses for subsidy recipients.

Successfully implementing infrastructure projects also seems only to have a negligible impact on the probability of an official to be promoted, compared with the benefits attached to delivering political support. In addition, big infrastructure projects are inherently risky, and if such a project fails the further career of the responsible state official might well be over[10]. Together with the overall adverse incentive structure, the fact that the central state does not encourage risk taking by local officials might be another explanation why big infrastructure projects in Russia often lose steam before they have really started.

Looking on the involvement of state officials in criminal corporate raiding attacks in chapter 3, I even find some evidence that the central state might tolerate a certain degree of predatory activities by regional state officials, as long as these same officials deliver sufficiently high levels of political support to the federal centre. In other words, as long as election results for the Kremlin party and candidate in Duma and presidential elections are sufficiently high in a given region, successful entrepreneurs in the region cannot necessarily count on the central state to defend them against predatory local state agencies. As a result, Russia still suffers from relatively insecure property rights and an adverse investment climate in many regions, which in turn negatively affect firm entry and economic dynamism.

Comparing Russia with China again provides an interesting perspective in this respect. Since the onset of economic reform in 1978,

[10] Interview by the author with the editor in chief of the journal "Ural Expert", Yekaterinburg, October 10th, 2012.

China has put a system into place where the appointment of government officials is centralized, while at the same time regional administrations have a lot of autonomy concerning the implementation of economic policy. Thus, the Chinese system after 1978 is not too different from the Russian system after the 2004 reform that replaced elections of regional governors by presidential appointments.

However, in China's "regionally decentralized authoritarian system" (Xu 2011), the overarching incentive faced by government officials at all administrative levels throughout the country is to promote economic growth, as economic performance is the most important criterion used to decide if regional officials are promoted or not (Bo 2002, Tsui and Wang 2004, Li and Zhou 2005, Landry 2008). Since Deng Xiaoping started reforming China's incentive system in the late 1970s, political loyalty has become a much less important determinant of career success (Vogel 2011), even though loyalty still seems to play an important role in determining for example party rankings within the Chinese Communist Party (Shih et al., 2012).

At the same time that appointments and promotions are decided by the centre in Beijing, economic decision-making at the regional and local level is often very decentralized, giving local administrations a lot of possibilities to experiment with different policy solutions, and learn from each other (Montinola, Qian and Weingast 1995, Florini, Lay and Tan 2012).

While the 1994 tax reform provided local governments with sufficient income to implement meaningful industrial and economic policies (Wong 2000, Tsui and Wang 2004), the strong competition for investment between different provinces together with China's centralized cadre promotion system thus provides local officials with large enough incentives to use these possibilities in an efficient way.

Furthermore, China's centralized cadre promotion system also seems to be relatively efficient in promoting talent. While Yao and Zhang (2012) show that more capable local leaders are more likely to get promoted, Li et al. (2007) argue that the way the Chinese Communist Party is

choosing new members makes sure that party members have above-average abilities. Thus, it seems that Chinese state officials are on average able administrators. However (and in contrast to Russian state officials), due to the incentives they face they also seem to be autonomous enough to avoid being captured by businesses to an extent that would endanger the country's growth potential.

A further particularity in China's institutional set-up is that entrepreneurs generally get meaningful help and support by the state only once they have reached a certain level of success. For example, while it is relatively difficult for start-ups to get financing, life is getting much easier the more successful an entrepreneur becomes (Tsai 2004).

Entrepreneurs in China thus face strong incentives to grow, to reach a critical size and to make their success visible, in contrast to Russian entrepreneurs, who often try to "stay under the radar"[11] once they have become successful, in order to avoid the attention of criminal groups or predatory state officials.

In sum, incentives for bureaucrats and entrepreneurs in China often overlap and are aligned around the common objective of economic growth. Even in sectors where the Chinese state is not directly promoting an industry, local bureaucrats try to help or at least to avoid being too obstructive, as economic success in their locality ultimately benefits their career as well. At the same time, small firms try to fast reach a critical size, as this is the best way to consolidate their business and to ensure government support and additional growth in the future.

In contrast, Russian entrepreneurs and state officials face a whole array of incentives that make it more difficult for new firms to enter, innovation to happen, for firms to grow, and for industrial policy to produce results. To make the Russian economy more dynamic and

[11] The expression "staying under the radar" comes from a Russian entrepreneur with whom I had a conversation on a train from Moscow to Simferopol, in late 2008. He told me that his business was going well, but that he avoided advertising his success, in order not to attract the attention of predatory state agencies.

industrial policy in the country successful, a fundamental reform of Russia's current institutional set-up would be necessary.

However, as I will show in chapters 2 and 3, Russia's current incentive structure is one of the foundations on which the hold on power of the country's ruling elites is based. These elites have therefore no incentives to reform the system, as such a reform would put their own position into danger. The Russian Federation in 2013 is thus an example of a country where the ruling elites, faced by a trade-off between economic growth and political control over the country, seem to have chosen the second over the first objective.

1.3 Absorptive Capacity and Innovation

While chapters 2 and 3 below are closely related to the topic introduced above, the empirical study of absorptive capacity presented in chapter 4 (written together with Letizia Montinari[12]) stands on its own. However, the questions introduced by chapter 4 are actually not unrelated to the situation of the Russian economy today.

In chapter 4, we have tried to find a methodology that is able to measure the ability of developing and emerging economies to absorb technology developed abroad. Various case studies of economies that have successfully managed to economically catch up have shown that being able to absorb technology developed elsewhere has played a crucial role in these countries (see Johnson (1982) for a study on Japan, Amsden (1989) for South Korea, Wade (1990) for Taiwan and more recently Breznitz and Murphree (2011) for China).

China again provides probably the most illustrative example in this respect. One of the major initiatives pushed forward by Deng Xiaoping in the late 1970s and early 1980s was to buy technology from abroad,

[12] University of Trento

and to learn how to adopt this technology to China (Vogel 2011). Over a vast range of manufacturing sectors, China thus bought foreign technology or entered into joint-ventures with foreign companies, in order to learn how to use this technology at home (Thun 2005, McGregor 2010, Ernst 2011).

As a result of these policies, a range of new manufacturing industries emerged throughout the country. While a couple of years ago, these industries still suffered from often severe quality deficiencies, within-country competition and China's specific incentive structure made it possible that they eventually learned how to adopt and use foreign technology in an efficient way. Today, these industries are now fast becoming competitive on world markets, and have recently started to innovate by themselves[13].

An example that illustrates the differences in technology policy between Russia and China is a joint-venture between Siemens and a number of Chinese train companies in the early 2000s, to produce 60 *Velaro* high-speed trains in China. Siemens had to agree to transfer a significant amount of technology to its Chinese partners, who now are building the next generation of *Velaro* trains by themselves, with Siemens remaining involved only as a minor supplier (Lee 2012, Massie 2012). Effectively enforced government policies that made wide-ranging transfer of technology a condition for the joint-venture played a key role during the deal (McGregor 2010).

Although Siemens initially proposed a similar agreement to Russia, *Russian Railways* finally simply bought 8 *Velaro* trains from Germany, together with a 30-year maintenance contract. While China has now a thriving industry of high-speed trains, for Russia the deal did not entail any significant technology transfer[14]. It is not improbable that the risk-

[13] An example being the Shanghai Motor Show 2013, where for the first time Chinese car makers have presented models that seem to be equal or even superior in quality to models presented by their Western competitors, see e.g. *Der Spiegel*, 23.04.2013, *Autos aus China: Schluss mit Schrott*.

[14] Railway Gazette, 01.06.2006, "Velaro RUS to St. Petersburg".

and growth-adverse incentive climate prevalent in Russia played an important role in shaping the decision of state-owned *Russian Railways* to opt for the second, less risky but also less beneficial contract with Siemens.

It thus seems that apart from Russia's adverse incentive climate, a further point hampering growth prospects of the country is the very nature of the industrial policy initiatives attempted by the Russian state. While China and a number of other successful East Asian economies have focused on absorbing technology from abroad before starting to innovate themselves, current policy by the Russian government tries instead to leap-frog this intermediate stage, in trying to build innovative indigenous industries from scratch, while technology absorption is not a special priority.

An example is the nanotechnology industry. Although Russia has no significant production facilities in nanotechnologies, and is still relatively far away from the global technological frontier, since 2007 the Russian state has bookmarked important resources to build domestic innovation capabilities in nanotechnology (about $3.3 billion until 2015, see Connolly 2012). However, results are rather disappointing to date, with the private sector remaining reluctant to join state-financed initiatives, and with Russia's share in the global nanoindustry market remaining very low. Connolly (2012) thus argues that it seems to be too early for Russia to attempt building new domestic high-technology industries.

If one considers the examples of the successful economies in Asia, it would probably be advisable for Russia to focus on absorbing foreign technology instead, in order to modernize the country's often outdated industrial infrastructure, before starting to concentrate on fostering domestic innovation.

While chapter 4 focuses on two basic determinants of absorptive capacity (human capital and domestic R&D), in future research (once

better data becomes available[15]) it would therefore be interesting to empirically investigate the *institutional* determinants of absorptive capacity, which might provide interesting insights for contexts such as the Russian Federation.

Investigating the institutional determinants of absorptive capacity empirically is a promising subject to study, as presumably both promoting successful technology absorption, and building domestic high-tech industries necessitates the kind of embedded but autonomous state bureaucracy described above, if these objectives are to be achieved by state-led industrial policies.

As the Russian bureaucracy so far lacks these characteristics, and as institutional reform looks unlikely under the country's current regime, replacing some industrial policies by a more open economic regime might be the last option available to reintroduce competition and economic dynamism to the country. Probably, Russia's decision to finally join the WTO in late 2012 was motivated by this idea, at least to a certain extent.

The remaining three chapters of this dissertation will now empirically investigate some of the topics raised above. Chapter 2 will look on the change in the incentive structure for Russian governors, once gubernatorial elections were replaced by presidential appointments in 2004. Chapter 3 will introduce a novel dataset on corporate raiding attacks in Russia, to investigate why corrupt state agencies have increasingly become involved in the criminal theft of corporate property in the country. Finally, chapter 4 presents a joint work with Letizia Montinari, where we examine the factors that determine the ability of developing countries to absorb technology developed abroad.

[15] The problem we faced in our study was data availability. For many countries (including the Russian Federation and most other former Soviet republics), sectoral data of the kind we use in chapter 4 is not yet available, or has only very recently become available.

1.4 References

[1] Amsden A. (1989), Asia's Next Giant: South Korea and Late Industrialization, *Oxford University Press*, Oxford

[2] Bai C., Qian Y. (2010), Infrastructure Development in China: The Cases of Electricity, Highways and Railways, *Journal of Comparative Economics*, 38(1), 34-51

[3] Balzer H. (2011), Learning to Innovate? Education and Knowledge-Based Economies in Russia and China, *Mortara Working Paper 2011-17*, Georgetown University

[4] Bo Z. (2002), Chinese Provincial Leaders: Economic Performance and Political Mobility since 1949, *M.E. Sharpe*, Armonk, NY

[5] Bradsher K. (2010), China Sees Growth Engine in a Web of Fast Trains, *The New York Times*, February 13th, 2010

[6] Breznitz D., Murphree M. (2011), Run of the Red Queen: Government, Innovation, Globalization, and Economic Growth in China, *Yale University Press*, New Haven

[7] Bruno R., Bytchkova M., Estrin S. (2011), Institutions and Entry: A Cross-Regional Analysis in Russia, *IZA discussion paper*, No. 5504

[8] Connolly R. (2011), State-led Modernization in Russia: The Nanotechnology Industry, *Russian Analytical Digest*, 105, 4-9

[9] EBRD (2012), Diversifying Russia: Harnessing Regional Diversity, *European Bank for Reconstruction and Development*, London

[10] Ernst D. (2011), China's Innovation Policy is a Wake-Up Call for America, *Analysis for the East-West Center No. 100,* East-West Center, Hawaii

[11] Evans P. (1995), Embedded Autonomy: States and Industrial Transformation, *Princeton University Press*, Princeton

[12] Florini A., Lai H., Tan Y. (2012), China Experiments: From Local Innovations to National Reform, *Brookings Institution*, Washington

[13] Frye T., Reuter O., Buckley N. (2011), The Political Economy of Russian Gubernatorial Election and Appointment, *working paper BRP 01/PS/2011*, Higher School of Economics, Moscow

[14] Frye T., Reuter O., Szakonyi (2012), Political Machines at Work: Voter Mobilization and Electoral Subversion in the Workplace, *working paper BRP 08/PS/2012*, Higher School of Economics, Moscow

[15] Gershman M. (2013), Programmi Innovatsionnogo Rasvitija Kompanii c Gasudarstvennim Utshastiem: Pervie Itogii (Programmes to further Innovation in Companies where the State is a Sharehiolder: First Results), *Forsight*, 7(1), 28-43

[16] Hanson P. (2012), Why is Russian Modernisation so Difficult?, in Barysch K. (ed.), Three Views on Modernisation and the Rule of Law in Russia, *Centre for European Reform*, London

[17] Heilmann S., Shih L. (2013), The Rise of Industrial Policy in China, 1978 – 2012, *Harvard-Yenching Institute working paper series*, January 2013

[18] Johnson C. (1982), MITI and the Japanese Miracle: The Growth of Industrial Policy, 1925 - 1975, *Stanford University Press*, Palo Alto

[19] Kessler K., Levin I. (2012), Staatskorporationen im Kontext der Transformation, *mimeo*

[20] Khan M., Jomo K. (2000), Rents, Rent-Seeking and Economic Development: Theory and Evidence in Asia, *Cambridge University Press*, Cambridge

[21] Klapper L., Laeven L., Rajan R. (2006), Entry Regulation as a Barrier to Entrepreneurship, *Journal of Financial Economics*, 82(3), 591-629

[22] Landry P. (2008), Decentralized Authoritarianism in China: The Communist Party's Control of Local Elites in the Post-Mao Era, *Cambridge University Press*, New York

[23] Lee K. (2012), The Evolution and Outlook of Core Technologies for High-Speed Railway in China, *Lecture Notes in Electrical Engineering*, 148, 495-507

[24] Li H., Liu P., Zhang J., Ma N. (2007), Economic Returns to Communist Party Membership: Evidence from Urban Chinese Twins, *The Economic Journal*, 117(523), 1504-1520

[25] Li H., Zhou L. (2005), Political Turnover and Economic Performance: The Incentive Role of Personnel Control in China, *Journal of Public Economics*, 89(9-10), 1743-1762

[26] Massie J. (2012), Digestion and Re-Innovation: A Lesson Learned from China's High-Speed Rail Technology Transfer Agreements, *Intellectual Property Brief*, 3(1), 25-26

[27] McGregor J. (2010), China's Drive for 'Indigenous Innovation' - A Web of Industrial Policies, *US Chamber of Commerce*, Washington

[28] Montinola G., Qian Y., Weingast B. (1995), Federalism, Chinese Style: The Political Basis for Economic Success in China, *World Politics*, 48(1), 50-81

[29] Nemtsov B., Milov V. (2008), Nezavisimii Ekspertnii Doklad: "Putin.Itogi" (Independent Expert Report – "Putin.Results"), *Novaya Gazeta*, Moscow

[30] Pynnöniemi K. (2008), The Transport Infrastructure in Russia: From Modernization to Development, Fact and Fiction, *briefing paper No. 16*, The Finish Institute of International Affairs

[31] Qian Y., Roland G. (1998), Federalism and the Soft Budget Constraint, *American Economic Review*, 88(5), 1143-1162

[32] Rochlitz M. (2009), The Political Economy of Industrial Policy in Putin's Russia, *working paper*, IMT Institute for Advanced Studies, Lucca

[33] Rochlitz M. (2012), Industrial Policy and State Capacity: A Comparative Analysis of Russia and China, *working paper*, IMT Institute for Advanced Studies, Lucca

[34] Shih V., Adolph C., Liu M. (2012), Getting Ahead in the Communist Party: Explaining the Advancement of Central Committee Members in China, *American Political Science Review*, 106(1), 166-187

[35] Sprenger C. (2010), Gosudarstvenaja Sobstvenost v Rossiskoi Ekonomike: Problemi Upravlenia i Vlianie na Efektivnost (State Property in the Russian Economy: Management Problems and Effectiveness), *Zhournal Novoi Ekonomitheskoi Asotsiatsii*, 7, 90-110

[36] Thun E. (2005), Changing Lanes in China: Foreign Direct Investment, Local Governments, and Auto Sector Development, *Cambridge University Press*, Cambridge

[37] Tsai K. (2004), Back-alley Banking: Private Entrepreneurs in China, *Cornell University Press*, Ithaca

[38] Tsui K., Wang Y. (2004), Between Separate Stoves and a Single Menu: Fiscal Decentralization in China, *The China Quarterly*, 177, 71-90

[39] Vogel E. (2011), Deng Xiaoping and the Transformation of China, *Harvard University Press*, Cambridge, MA

[40] Wade R. (1990), Governing the Market: Economic Theory and the Role of the Market in East Asian Industrialization, *Princeton University Press*, Princeton

[41] Wong C. (2000), Central-local Relations Revisited: the 1994 Tax Sharing Reform and Public Expenditure Management in China, *China Perspectives*, 31, 52-63

[42] Xu C. (2011), The Fundamental Institutions of China's Reforms and Development, *Journal of Economic Literature*, 49(4), 1076-1151

[43] Yao Y., Zhang M. (2012), Subnational Leaders and Economic Growth, *mimeo*

[44] Zhang J. (2011), Interjurisdictional Competition for FDI: The Case of China's "Development Zone Fever", *Regional Science and Urban Economics*, 41, 145-159

Chapter 2

Elections vs. Appointments: Comparing Incentive Patterns for Russian Governors under Putin

2.1. Introduction

In early September 2004, a hostage crisis in the Southern Russian city of Beslan claimed more than 380 victims, after a rescue attempt by federal police forces went awry. During late 2004, the Beslan crisis had widespread political repercussions in Russia, triggering a government reform that lead to the consolidation of power around the Kremlin and the president of Russia, while Russia's formerly powerful regional governors were weakened.

At the core of this centralizing reform was the abolishment of gubernatorial elections. While from the mid-1990s up to 2004, the powerful leaders of Russia's more than 80 regions were publicly elected in their regions, from 2005 onwards the Russian president had the right to appoint and dismiss regional governors. Only in late 2012 were gubernatorial elections tentatively reintroduced in some of Russia's regions.

The centralizing reforms carried out in late 2004 constitute an interesting natural experiment, and provide a promising testing ground to examine a couple of questions. To what extent has switching from gubernatorial elections to presidential appointments helped the Kremlin to enhance its political control over Russia's regions, and over

the country as a whole? Are there differences in the economic and social outcomes produced by elections and appointments of regional governors in an electoral authoritarian regime such as the Russian Federation? In the case of appointments, might there be a trade-off between political loyalty and economic performance? How do the incentives faced by regional governors differ between both institutional mechanisms?

An extensive literature has looked on appointment patterns for regional officials throughout various institutional contexts. A number of especially interesting studies has examined the incentive climate in China. For example, Li and Zhou (2005) have shown that during the reform era, economic performance seems to be the main criterion determining the promotion of regional officials in China's provinces. They find that the higher is the personal economic performance of a regional executive, the higher are his chances to stay in office or to be promoted. Li and Zhou argue that in the context of China's specific institutional system where economic decision-making is decentralized but personnel appointments are centralized, this incentive structure has been one of the main drivers of China's economic success.

Other studies on China's system of centralized personnel control have found similar results, showing how the country's appointment system creates pro-growth incentives for local officials (Bo 1996, 2002, Li 1998, Landry 2008, Yao and Zhang 2012). Zheng et al. (2012) found that apart from growth, environmental protection has also recently become an important criterion determining the promotion of urban officials in China. However, in another recent study Shih et al. (2012) employ a novel Bayesian method to challenge this consensus, in arguing that political loyalty has remained a major determinant of party rank positions within the Chinese Communist Party.

The literature on appointments of regional officials and centre-region relations in Russia is equally vast. A number of studies have examined gubernatorial elections and presidential appointments of regional governors in the country, using different methodologies and adopting different perspectives (see e.g. Stoner-Weiss 1999, 2002, Chebankova

2006, Konitzer 2006, Goode 2007, Wegren and Konitzer 2007, Reisinger and Moraski 2009, 2011, Reuter 2010, Sharifutdinova 2010, Turovsky 2010, Blakkisrud 2011, Frye, Reuter, Buckley 2011, Reuter and Robertson 2011 or Nye and Vasileva 2012 - a detailed discussion of the literature on Russia will be held in section 2.2). Generally, studies find that political loyalty has become a more important selection criterion for regional governors after 2004, once elections were replaced by appointments (Reuter and Robertson 2011, Reisinger and Moraski 2011). An increasing co-optation of regional and federal elites around the Kremlin party United Russia, consolidating authoritarian tendencies in the Russian Federation, has also been identified (Reuter and Remington 2009, Gelman 2010, Mendras 2012).

Apart from the country-specific literature on Russia and China, the question of how to appoint bureaucrats and regional officials in order to achieve desired outcomes has also been studied by a more general literature. While Jones and Olken (2005) have found that the characteristics of individual leaders do matter for economic growth, Evans and Rauch (1999) underline the importance of meritocratic selection procedures. However, how best to achieve meritocratic selection, and the role played by elections and appointments in this respect, remains a question under debate.

Besley and Coate (2003) argue that US states where regulators are elected (instead of being appointed) are more pro-consumer in their regulatory policies. In contrast, Maskin and Tirole (2004) find that appointed officials produce better outcomes in contexts where the public is poorly informed about the issues at stake. Alesina and Tabellini (2007, 2008) examine the incentives faced by appointed bureaucrats and elected politicians from a theoretical perspective, and find that generally bureaucrats perform better for technical tasks for which ability is more important than effort, as well as in cases where vested interests play a role, while elected politicians are preferable if there is uncertainty about social preferences. Looking on justices in US states' Supreme Courts, Iaryczower et al. (2013) argue that justices that are appointed perform better than those that are elected.

While the above papers study the question in the context of the United States, investigating elections and appointments of regional officials in an electoral authoritarian regime such as Russia introduces a further dimension to be taken into account. Levitsky and Way (2002) classify Russia as a competitive authoritarian regime, which they define as a regime where elections exist and are viewed as the primary means to obtain power, but where incumbents violate the rules to such an extent that even minimum democratic standards are not observed. In such regimes, despite widespread electoral fraud, elections still play an important role in providing legitimacy for the ruling elites, in permitting the elites in power to co-opt opponents and to judge the performance of subordinates (who are expected to mobilize electoral support), or in mitigating commitment problems between a dictator and the different clans and factions on whose support the dictator has to rely (Magaloni 2008, Gandhi and Lust-Okar 2009, Svolik 2012).

Obtaining high levels of turnout and high results in national elections thus remains crucial for the ruling elites to defend and legitimize their hold on power. Consequently, they have to make sure that lower-level officials throughout the country deliver sufficiently high levels of turnout and electoral support for the president and the ruling party in national elections. In cases where regional officials are appointed by the ruling elites, political loyalty thus becomes an important criterion determining the selection of regional officials. However, the economic performance of these officials also remains important. One of the main reasons for Vladimir Putin's popularity during his first two terms in office has been Russia's relative high levels of economic growth during the period. Moreover, Reuter and Gandhi (2011) show how the likelihood of defections from hegemonic parties such as the Kremlin party United Russia increases as income declines.

In a competitive authoritarian regime like that of contemporary Russia, the ruling elites thus have to appoint regional officials that are, ideally, both politically loyal and economically competent. The problem here is that there might well be a trade-off between political loyalty and economic performance. Looking at a cross-section of countries, Wagner

(2011) finds evidence for such a trade-off, with agency competence being the lower the more important is loyalty and the shorter are time horizons. Focusing on authoritarian regimes, Egorov and Sonin (2011) have shown that rulers might prefer to hire mediocre but loyal subordinates, in order to mitigate the risk of being overthrown. More specifically, Frye, Reuter and Szakonyi (2012) found that employers in the least dynamic sectors in Russia are especially likely to mobilize their workers to vote for the regime. In order to demonstrate his political loyalty to the centre, a Russian regional governor might thus give preferential treatment to firms that otherwise perform badly or would probably be closed down, as these firms are most likely to provide the necessary electoral support during national elections.

In this paper, I want to test to what extent concerns of political loyalty and economic competence determine appointment decisions of regional governors in a competitive authoritarian regime, the Russian Federation. I also want to test to what extent the incentives faced by governors differ between an electoral and an appointment regime. In order to make my results comparable to results obtained for China by Li and Zhou (2005), I use an ordered probit specification that is as similar as possible to their study of Chinese provincial governors, together with a newly compiled dataset on Russian gubernatorial elections and appointments from 1999 to 2012.

In contrast to the results found by Li and Zhou (2005) for China, this paper finds that economic and social outcomes have almost always an insignificant or negative effect on the probability of a Russian regional governor to be re-elected, re-appointed or promoted. Most strikingly, once the federal centre started appointing its candidates in earnest (i.e. from 2007 onwards), the personal economic performance of a regional governor has a strong, significant and negative effect on her or his probability to remain in office. In other words, from 2007 onwards the better a governor performs economically, the lower are her or his chances to remain in office. On the other hand, from 2007 to 2012 political loyalty has a significant and positive effect on the probability of a governor to remain in office or to be promoted.

I interpret these findings as evidence that in contrast to the Chinese Communist Party in Beijing, the Kremlin uses gubernatorial appointments not to promote economic growth, but to generate political support for the ruling elites in the federal centre. I then also argue that the resulting adverse incentive structure faced by regional officials might be one of the reasons for the lack of economic dynamism that Russia has experienced during recent years (see e.g. EBRD 2012).

The chapter is organized as follows. Section 2.2 describes the context of centre-region relations in Russia, the particular role played by Russia's governors, and the 2004 reform that replaced gubernatorial elections with presidential appointments. Parts 2.3 and 2.4 introduce the econometric specification and the data used. Part 2.5 presents the regression results, and part 2.6 concludes.

2.2 Russia's Governors under Putin

During the unstable 1990s, Russia's 89 regions[16] managed to gather a significant degree of autonomy with respect to the federal centre in Moscow (Stoner-Weiss 1999). An important role in this respect was played by the executive heads of Russia's regions, which for simplicity I will refer to as "governors" in this paper (although the rulers of Russia's regions are called by a variety of names; for example, Russia's ethnic republics are generally headed by a president, while oblasts are ruled by a governor and federal cities by a mayor).

Since the mid-1990s until the end of 2004, these governors have been publicly elected in their respective region (with the 1996/1997 election cycle being the first time that direct gubernatorial elections were held throughout all of Russia's regions). The validity of these elections has been disputed, with some authors arguing that incumbent governors

[16] Under Putin, a number of regions have since been merged into larger units, so that the Russian Federation today is composed out of 83 federal subjects.

extensively used administrative resources and political machines to manipulate election results in their favour (Hale 2003). Still, others have found that the need to hold gubernatorial elections played an important role in keeping governors accountable to their electorate (Konitzer 2006), and that sometimes regional legislatures played a significant part in keeping gubernatorial elections competitive (Bilev 2011). Having a look at the data also shows that despite the apparent advantages held by incumbents, gubernatorial turnover and the number of incumbents losing an election has been substantial between the late 1990s and 2004 (see figure 2.1, section 2.4).

The fact of being publicly elected, as well as the pivotal position governors occupied as arbiters between regional and federal interests, made them into powerful players in Russian politics. In several instances, governors were the driving force to push regional autonomy ahead, as for example in the case of Sverdlovsk governor Eduard Rossel, who campaigned for the establishment of an autonomous "Urals Republic" in his region (Easter 1997). They also played an important role on the federal level, as from 1996 onwards governors were automatically guaranteed ex offico membership in the upper chamber of the Russian Federation, the Federation Council (Ross 2010). Finally, governors also played an important economic role in their regions, as their position permitted them to conduct, participate in and benefit from the extensive economic restructuring that took place during the 1990s in Russia (Stoner-Weiss 2002, Hale 2003).

When Vladimir Putin came to power, one of his stated objectives was to reconsolidate the federal state, and to re-establish the so-called "vertical of power". Shortly after coming to office, he introduced a series of measures to curtail the power of regional governors. From 2000 onwards, governors were no longer automatically members of the Federation Council. 7 federal districts were formed to increase the direct oversight of the presidential administration over regional governors, and regional laws and charters (often favouring specific regions) were streamlined and brought into conformity with federal law. A new tax code rendered even donor regions dependent upon

federal transfers, and regional political parties - often serving as electoral vehicles for the governors - were eliminated (Goode 2007, page 373). At the same time, big business corporations, often with the implicit approval of the presidential administration, were also moving increasingly into the regions, challenging the economic control acquired by regional governors during the late 1990s (Orttung 2004, Zubarevich 2005). For instance, during the early 2000s, big corporations played an important role as sponsors of corporate raiding attacks throughout Russia's regions, attacking and absorbing smaller firms to complete and consolidate their economic holdings (see chapter 3 below).

Still, during Putin's first term as president (2000-2004), the Kremlin failed to decisively gain back control over the regions. For instance, in several cases Kremlin-backed candidates lost regional elections against incumbents who had built political machines that were sufficiently strong to prevail against the federal centre (Chebankova 2005, pages 941-942).

Many observers thus see the Beslan tragedy as a pretext used by the presidential administration to introduce a final decisive move against regional governors, with the introduction of the reform abolishing gubernatorial elections. Goode (2007, page 374) notes that "the governors greatest remaining resource by the start of Putin's second term was their elected status". He also points out that Putin's team produced a draft law on gubernatorial reform a mere two weeks after the Beslan incident, indicating that such a law had been in preparation for some time (Goode 2007, page 366). Goode then moves on to ask why governors mounted so little resistance against the reform, in contrast to earlier similar attempts by the Kremlin that had been vehemently opposed.

This is indeed a good question, as just after the introduction of the reform a large majority of governors publicly endorsed the new law, by asking the president to confirm their position as governor, even though by the new law they could not legally be sacked until the end of their terms in office. Goode explains this lack of public opposition by a

change in the way Putin's regime was perceived by political actors in Russia. By 2005, most political actors in the country had accepted that Putin's regime was there to stay. They thus no longer tried to challenge or change the system, but started looking and competing for positions within the system. In this respect, for many governors it suddenly seemed easier to secure their position by demonstrating political loyalty to the president, instead of relying on an insecure and moody electorate. Indeed, in a context where regional gubernatorial elections had often been tainted by allegations of widespread electoral fraud, for many governors being appointed by the most powerful figure in the nation might have started to look like an enhancement of their personal legitimacy, rather than a loss of authority (Goode 2007, pages 376-377).

In order not to scare regional governors and to inadvertently provoke resistance where none had existed in the first place, during the years 2005 and 2006 the Kremlin refrained from firing any of the governors that had appealed to the president for a confirmation of their position (Turovsky 2010). It was only in 2007 that the presidential administration started in earnest to replace incumbent governors and to appoint its own candidates, with the president refusing to express his confidence in Sakhalin governor Ivan Malakhov in August 2007 being the first incident (Turovsky 2010, page 60; see also table 2.1, section 2.4).

It is probably no coincidence that the Kremlin started using the possibility to appoint and fire regional governors at the beginning of the 2007/2008 election cycle. Several factors contributed to a climate of uncertainty during the year 2007. Until early December, it was unclear who would succeed Vladimir Putin as president of the country, and evidence for considerable infighting among rival Kremlin factions became visible[17]. Simultaneously, genuine fears of a 'coloured

[17] In October 2007, Viktor Cherkesov, head of the Federal Drug Control Service and also head of an influential Kremlin faction, published an open letter in the newspaper Kommersant, warning that rival security factions were about to clash about questions of Putin's succession (see e.g. an article published in The Moscow Times in December 2007,

revolution' seem to have existed among the Kremlin leadership (Duncan 2013), so that a strong showing of the Kremlin party United Russia in the 2007 Duma elections probably appeared to be of special urgency to the ruling elites. In this context, it seems likely that the Kremlin used all means available to incentivize local elites and administrations to assure a high turnover and high results for the Kremlin party in the 2007 Duma elections, as well as for the Kremlin candidate in the 2008 presidential elections (that Dmitry Medvedev would be this candidate was announced on December 10th, 2007). That this is indeed what happened has been argued by a range of studies (see e.g. Tkacheva 2008, Myagkov et al. 2009, Reisinger and Moraski 2009, Bacon 2012).

How exactly regional governors might use their position to deliver high election turnout and electoral support for the federal centre has been documented by Frye, Reuter and Szakonyi (2012). Using survey data of employers and workers from the 2011 parliamentary elections in Russia, they found that about a quarter of employers in the sample actively tried to influence the voting decision of their employees. They cite the symptomatic story of the mayor of Novokuznetsk, a large industrial city in Siberia, addressing a gathering of company directors, inciting them to encourage their workers to vote for United Russia. During his speech, the mayor explicitly mentions the regional governor:

"We need to carry out these elections in the proper manner so it won't be painful or uncomfortable. You are all smart people; you are all directors. You saw the recent United Russia congress; you saw that, on Friday, the governor gathered a team to discuss preparations for the parliamentary elections on December 4. It's clear to everyone that United Russia should win." (Frye, Reuter and Szakonyi, 2012, page 11)[18].

---

describing the infighting between two rival Kremlin factions; Siloviki Clash in Storchak Affair, The Moscow Times, December 7th, 2007).

[18] The whole speech can be watched on youtube (accessed on March 24th, 2013), www.youtube.com/watch?v=kD4W5zAKlCg&feature.

The story nicely demonstrates how the chain of command goes from the federal centre to the regional governor, and from there to local officials such as the mayors of major towns, who in turn encourage local employers to do their share in achieving expected election results. Frye et al. then also show that large and state-owned firms, as well as firms with immobile assets, firms that sell to the state, and firms that provide their employees with significant non-wage benefits and hire in slack labour markets are especially likely to mobilize their employees (as these firms do both depend more on the state and are better able to exert pressure on their employees).

Apart from using employers, regional governors are also encouraged to serve as poster-candidates in Duma elections. According to Tkacheva (2008), during the 2007 Duma elections 65 governors headed their regional United Russia party list, but only one subsequently accepted his Duma mandate. Tkacheva then also outlines further possibilities of regional governors to influence election results. As governors control the Regional Election Commissions, they can use this control to increase the cost of entry for opposition parties during the obligatory registration phase. During the campaign, a governor can decide which parties are allowed to post information material in public places and on public transport. She or he can enlist public sector employees to distribute campaign materials, provide timely information about social and business events in a region to candidates of the government party, as well as slow down the campaign of opposition parties by sending in the tax police or fire inspection to their local campaign offices. During election day, a governor can staff polling stations with loyal bureaucrats, who have strong incentives to inflate both voter turnout and the vote share of the ruling party, as they are in direct competition with other polling stations in their city and region (Tkacheva 2008, pages 4 and 5).

We thus end up with an environment where the regional governor has a multitude of possibilities to deliver a high vote share for the ruling party during national elections. As a regional governor is in direct competition with governors in other regions, and as the Kremlin knows

about previous voting results in a given region, it is also relatively easy for the presidential administration to monitor to what extent a governor actually delivers high levels of turnout and a high vote share for United Russia. Finally, with the help of gubernatorial appointments, the Kremlin has since 2005 a method at hand to actively discipline governors who do not deliver. In other words, given the substantial interests the Kremlin has in achieving specific election outcomes, it is very likely that election results are one of the main criteria determining appointment decisions of regional governors by the president.

This is indeed what has been argued and found by a range of studies (see Wegren and Konitzer 2007, Sharafutdinova 2010 or Turovsky 2010 for a descriptive analysis). For instance, using data of gubernatorial appointments between 2005 and 2010, Reuter and Robertson (2011) find that the 2007 Duma election vote share for United Russia has a positive effect on gubernatorial appointments. Similarly, Reisinger and Moraski (2011), using survival analysis and data for 2005 to 2011, find that governors in regions with strong support for the ruling party in federal elections face a reduced hazard of losing office.

In this paper, I find similar results. However, disaggregating the period of presidential appointments between the years 2005 and 2006, when the Kremlin just indiscriminately reappointed every governor that applied for reappointment, and the period 2007-2012, when the Kremlin started to fire selected candidates and appoint its own candidates in earnest, permits to show just how significantly appointment criteria changed between both periods. While election results of the 2003/2004 election cycle had actually a significant and negative effect on appointments during the years 2005 and 2006, from 2007 onwards election results have a significant and positive effect on reappointments (see section 2.5).

In contrast to election results, economic performance and social outcomes appear to be of no importance in determining appointment decisions from 2007 onwards. This is especially striking as during the debate around the 2004 reform, one argument in favour of the reform was that in the future, governors could focus much more than before

on regional economic development, as they no longer had to care about specific interest groups and elections. For example, Moscow mayor Yuri Luzhkov noted in 2004, in support of the reform, "that a governor should be concerned with the regional economy first and foremost, acting as a manager first, and to a lesser degree as a politician" (Goode 2007, page 373).

In theory, the reform indeed made the Russian system much more like the Chinese one, as personnel control was now centralized, while governors still had a lot of leeway to economically manage their regions. Thus, at least theoretically and using the right appointment criteria, the Kremlin could have used the new system to boost regional economic growth, by creating a strong pro-growth incentive climate.

However, I find that from 2007 onwards, while the yearly growth rate of gross regional product has a negative but insignificant effect on appointments, the personal economic performance of a governor (see section 2.3 for details on how the indicator is constructed) has a significant and negative effect on the probability of a governor to remain in office.

Above, we have seen a first description of how the system of centre-region relations and the incentives faced by regional governors changed after the introduction of the 2004 reform. Sections 2.3 and 2.4 will now present the methodology and data used in this study, before a detailed discussion and interpretation of the regression results will be held in section 2.5.

2.3 Econometric Specification

As the stated objective of the 2004 reform was to enhance federal control over the regions in order to produce better social and security-related outcomes, the first hypothesis I want to test is how much the economic performance of a governor plays a role in determining his probability of staying in office, both under the electoral and the appointment regime. I then also add a number of additional variables to control for social outcomes, such as regional levels of crime, unemployment and inflation, as well as an indicator for the quality of regional infrastructure.

The second hypothesis to test is to what extent the political loyalty of a governor matters for her or him to remain in office or to be reappointed. Following the discussion in section 2.2, I define political loyalty as the ability of a governor to deliver political support for the ruling elites in the federal centre, in the form of high election results in Duma and presidential elections in his region.

In order to be able to compare incentives faced by regional officials in Russia and China, the empirical strategy I use in this paper is kept similar to the one introduced by Li and Zhou (2005, page 1748). I employ an ordered probit model to examine the probability of a regional governor being re-elected, re-appointed or dismissed.

Suppose that the regional electorate (from 1999 to 2004) as well as the Russian president (from 2005 to 2012) base their decisions on an evaluation score y^*, which they form every year after observing and evaluating a number of performance criteria for each governor. While y^* is known to the regional electorate or the Russian president, we do not observe the score. We only observe if a provincial governor loses or wins an election, or is dismissed or reappointed. In other words, we observe the variable y, which is 0 for a governor losing an election or being dismissed, 1 for a governor remaining in office or being

appointed or elected for the first time, and 2 for a governor being re-elected by the regional electorate or re-appointed by the president[19].

Now assume that the latent evaluation score y^* is a linear function of a number of independent variables x, i.e. $y^* = x\beta + \varepsilon$, where β is a vector of coefficients, and ε is assumed to follow a standard normal distribution. We now define α_1 and α_2 as the two cut-off points of y^*, on which the decisions to re-elect or re-appoint a governor are based on. In other words, a governor loses an election or is dismissed by the president (y=0) if $y^* \leq \alpha_1$, stays in office (y=1) if $\alpha_1 < y^* \leq \alpha_2$, and is re-elected or reappointed (y=2) if $y^* > \alpha_2$ (see Li and Zhou 2005, page 1748).

Following Wooldridge (2002, chapter 15), the ordered probit model can then be expressed as

$$Prob(y_i = 0 \mid x) = \Phi(\alpha_1 - x\beta)$$

$$Prob(y_i = 1 \mid x) = \Phi(\alpha_2 - x\beta) - \Phi(\alpha_1 - x\beta),$$

$$Prob(y_i = 2 \mid x) = 1 - \Phi(\alpha_2 - x\beta),$$

where Φ is the cumulative standard normal distribution function.

As the objective of the paper is to compare the period when governors were elected with the period when governors were appointed by the president, I use two separate regressions to analyse each period. The first regression looks at the period from 1999 to 2004, i.e. the 6 years

[19] If a governor loses an election or is dismissed before July 1st in a given year, I code the year before as 0 (i.e. the last year the governor has been in office throughout the whole year), while counting the given year as the first year in office of the new governor (y=1). If a governor loses an election or is dismissed after July 1st in a given year, I count this as the last year of the governor in office (y=0), and count the next year as the first year in office of the new governor (y=1).

when Vladimir Putin was already the dominant political figure in the country, but when governors were still elected. The second regression focuses on the period when regional governors were appointed by the Russian president (2005 to 2012). As the federal centre started to replace regional governors in earnest only from 2007 onwards (Turovsky 2010, see also figure 1), I then also look separately on the two periods 2005 to 2006 and 2007 to 2012.

As described above, the main determinants of y that we are interested in are regional economic performance, and political loyalty of the governor to the federal centre. To measure regional economic performance, I use both the annual growth rate of regional GDP (growth), and the weighted average growth rate during the tenure of a governor as explanatory variables (av_growth).

As we have seen in section 2.2, governors are powerful figures in their regions, and a competent governor might well play a significant role in fostering regional growth. Thus, looking at annual regional GDP growth seems to be a sensible criterion to judge the performance of a governor. However, the regional electorate or the Russian president might also base their decision on a longer-term evaluation of a governor's activity. To incorporate the effect of past performance, regional GDP growth weighted by the time a governor is in office might thus offer a more precise indicator for the personal performance of a governor. Again following Li and Zhou (2005, page 1755), I therefore create a moving average measure of the GDP growth rate over the time a governor is in office, $\tilde{g}_T$, which is defined as

$$\tilde{g}_T = \frac{1}{T}\sum_{t=1}^{T} g_t$$

where T is the number of years a governor is in office up to the point of calculation, t is the t-th year (t = 1, 2,..., T-1, T), and g_t is the GDP growth in the year t for a region. Thus, $\tilde{g}_T$ corresponds to an evaluation mechanism in which there is an annual assessment, but where the

assessment is based both on the past and on the current performance of a governor in office.

As already mentioned in section 2.2, a good proxy for political loyalty is the ability of a regional governor to deliver high election results for the Kremlin party United Russia in Duma elections, and high results for the Kremlin candidate in presidential elections. The two main explanatory variables I use to proxy political loyalty are thus regional results for United Russia in Duma elections, and results for either Vladimir Putin or Dmitri Medvedev in presidential elections. For the period 1999 to 2004, I use election results in the 1999/2000 and 2003/2004 election cycle, while for the period 2005 to 2012, I use election results of the 2003/2004 and 2007/2008 election cycle (duma_elec, pres_elec).

I then also use an indicator developed by Dmitry Oreshkin (2007), which measures the degree to which election irregularities were noticeable in Russia's regions, and which might be used as a proxy of the degree that regional governors have attempted to deliver high election results to the centre (irregular). For the time period 1995 to 2007, Oreshkin identifies and collects various statistics that might indicate possible election irregularities from the website of the Central Election Commission of the Russian Federation, such as an implausibly high or low participation rate in elections (1), an implausibly high number of invalid votes (2), a very high or low share of votes "against all"[20] (3), an implausibly high vote share for a single party or candidate (approaching 100% in some Russian regions) (4), and a high difference between results in a particular voting district and results in neighbouring districts (5). He then aggregates these various measures to build an index that is ranking Russia's regions according to the degree that election irregularities occurred, on a scale from 1 (low level of irregularities) to 10000 (very high level of irregularities). For this study, I use the logarithm of his indicator as an additional explanatory variable.

[20] Until 2006, Russian electoral ballots contained a box named "against all", allowing the voter to register a protest vote against all the candidates running.

Apart from economic performance and political loyalty, a number of other criteria may also influence the election or appointment of regional governors. I first control for personal characteristics of regional governors, such as their age (age), the amount of time they have been in office (tenure), and their membership in the Kremlin party United Russia (un_rus). I also add a dummy which is 1 if the governor had no previous connection to the region he was appointed to, and 0 otherwise (central).

I then add a number of further variables that might measure the performance of a governor in office, such as the percentage of unemployed people in a region (unemploy), the number of criminal cases filed per year and capita in a region (crime), the yearly regional level of inflation (inflation), as well as the quality of regional infrastructure (infrastructure).

Finally, a set of controls for regional characteristics is also added, such as the log of gross regional product per head (ln_grph), a dummy that is equal to 1 if the region is among the 10 most important oil exporting regions in Russia (oil), and a measure for the percentage of the population that is Russian (ethnic). This last variable permits to control for Russia's ethnic republics, which are often characterized by a high percentage of non-Russians in their population, while also exhibiting particular high levels of electoral fraud.

2.4 Data

This study uses data covering 206 Russian regional governors who served in 81 Russian regions between 1999 and 2012. Data on these governors have been collected from official sources, such as the official websites of regional governors which normally provide extensive biographical information, as well as from other websites such as Wikipedia and various Russian websites that provide biographical data.

For each governor, I collected data on the dates of elections, appointments and terminations, as well as on their personal characteristics such as age, membership in the Kremlin party United Russia, and on the fact if a governor had any previous links to a province prior to becoming head of the regional administration. I define that a previous link to a province exists if a governor was born, had lived or worked for a period longer than 6 months in a given region, prior to being elected or appointed governor of the region.

The dependent variable y (turnover) in this paper is a discrete variable that can take the values 0, 1 or 2. The first year a governor is elected or appointed, as well as every following year in office (apart from the year of a re-election, re-appointment or promotion), is coded as y=1. The year of a re-election, re-appointment or promotion is coded as y=2, and the eventual end of tenure (termination) of a regional governor is coded as y=0, with end of tenure being defined as the governor not being promoted to a higher-level position on the federal level after the end of his tenure.

As being governor is usually the top-end position in a given region, taking on a different position in a region (i.e. not in the federal government or as head of a big corporation in Moscow) after the end of tenure is counted as a demotion (y=0). In the dataset, actual promotions (i.e. the governor moving on to a higher-level position after his end of tenure) are quite rare. For the whole dataset, only 13 out of 117

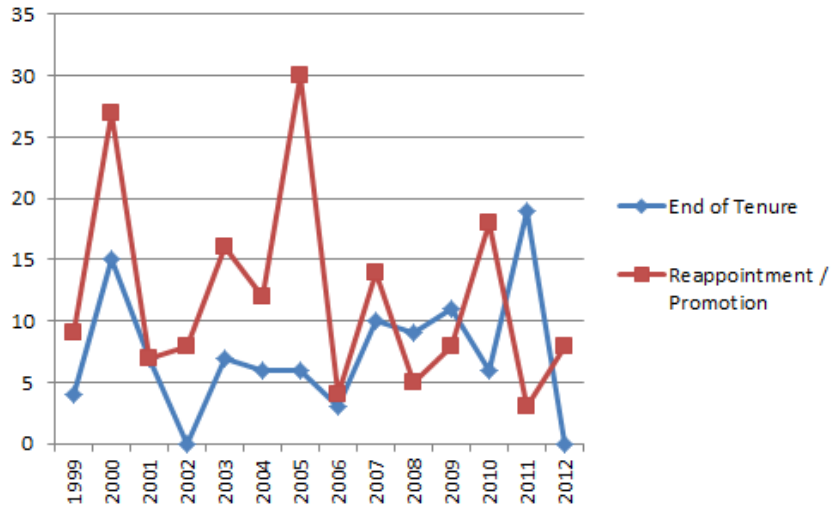
governors (11.1%) between 1999 and 2012 moved on to a higher level position after their end of tenure (y=2), while 104 governors (88.9%) took on a lower-level position or retired (y=0). For our study, this is important, as governors seem to have little outside options to get a better position after their job as governors. They thus face strong incentives to stay in office as long as possible. In other words, they have strong incentives to positively influence the latent evaluation score y^* formed by the local electorate (1999-2004) or the Russian president (2005-2012), on which their chances of being reappointed are based.

If a governor loses an election, is dismissed or promoted before July 1st in a given year, I code the year before (i.e. the last year the governor has been in office throughout the whole year) as 0 in the case of a demotion, and as 2 in case of a promotion, while counting the given year as the first year in office of the new governor (y=1). If a governor loses an election or is dismissed or promoted after July 1st in a given year, I count this as the last year of the governor in office (y=0 in the case of a demotion, or y=2 in the case of a promotion), while counting the next year as the first year in office of the new governor (y=1). If a governor dies in office (which happened 8 times during the period under study), I code the year as y=1.

Figure 2.1 shows the relative frequency of terminations (y=0) and re-elections, re-appointments and promotions (y=2) for the period from 1999 to 2012. For the beginning of the period, the two cycles of gubernatorial elections that took place in 2000 and 2003/2004 are visible, with terminations and re-elections moving together. The high number of re-appointments in 2005 is due to the fact that just after the reform, a large number of Russian regional governors (many of whom had just recently won an election) asked the federal centre to confirm their appointment. As the Kremlin wanted to avoid early clashes after the reform (Turovsky 2010), all governors that asked for a confirmation in 2005 and 2006 got reappointed. We then see that from 2007 onwards, the Kremlin started actively replacing regional governors. All in all, from 2005 to 2011, 60 governors that had been in office prior to 2005 were dismissed and replaced by Kremlin candidates. Of these 60

governors that were replaced, only three were not born or had not previously lived and worked in the region where they served as governor (5%). On average, they were 59.8 years old at the time they were dismissed, and 73.3% were members of United Russia.

Figure 2.1: Frequency of End of Tenure and Reappointments / Promotions over Time



On the other hand, 29 of the 83 governors (35%) that were appointed between 2005 and 2012 had no previous experience in the region they were appointed to (central=1). The average age of the governors appointed between 2005 and 2012 was 49.5 years when they assumed office, and 83% were members of United Russia. We thus see that governors newly appointed after 2004 were more likely to come from outside the region they were appointed to (see figure 2.2), i.e. the

Kremlin increasingly relied on outsiders and federal bureaucrats to impose its policies in the regions. We also see that governors appointed after the reform were slightly younger and a bit more likely to be a member of the Kremlin party United Russia than the governors they replaced.

Figure 2.2: Number of Governors without Prior Connection to a Region

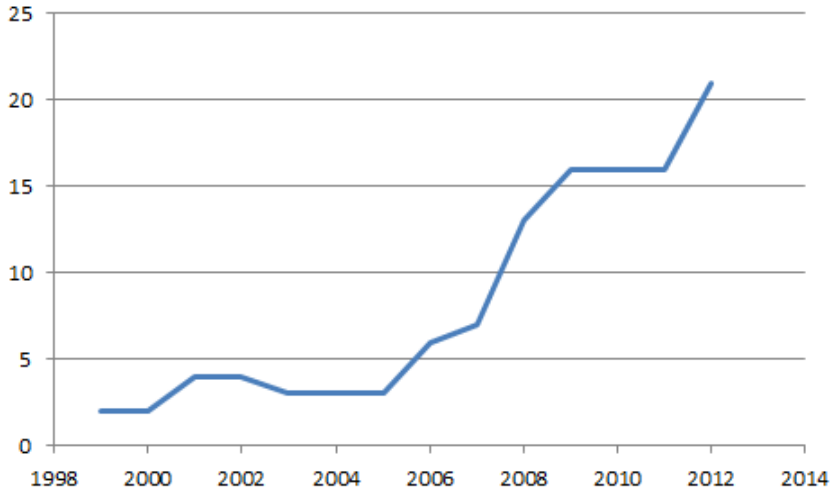


Table 2.1 presents summary statistics for all the variables used in this study. Data on regional economic growth, gross regional product per capita, the unemployment rate, the number of registered crimes per capita, oil production, the regional inflation rate and the percentage of the population living below the poverty line have been collected from the Russian Federal Statistics Service (www.gks.ru). Data on presidential and Duma election results in Russia's regions have been gathered from the Russian Central Election Commission

(www.cikrf.ru). The variable describing election irregularities (irregular), described more closely in section 3, has been obtained from an article by Dmitry Oreshkin, published in Novaya Gazeta in November 2007 (Oreshkin 2007). The number of ethnic Russians living in a region (ethnic) has been obtained from the website of Russia's national population census in 2010 (www.perepis-2010.ru). Quality of infrastructure in a region is measured by a yearly regional ranking, published by the Russian rating agency ExpertRA (www.raexpert.org), with a lower rank meaning better quality of infrastructure.

Table 2.1: Summary Statistics

Variable	Observations	Mean	St.Dev.	Min	Max
turnover	1134	1.05732	0.4857	0	2
growth	1134	0.05212	0.06058	-0.228	0.787
av_growth	1134	0.04118	0.04076	-0.202	0.357
pres_elec	1134	0.64123	0.12092	0.2501	0.9881
duma_elec	1134	0.424	0.18712	0.014	0.9872
irregular	1134	7.06649	1.17399	2.303	9.21
age	1134	54.47531	8.10287	34	76
tenure	1134	6.53086	4.44843	1	20
un_rus	1134	0.53439	0.49904	0	1
central	1134	0.10229	0.30317	0	1
unemploy	1134	0.09394	0.06426	0	0.78
crime	1134	0.02081	0.00695	0.0031	0.0494
inflation	1134	0.14489	0.08133	0.014	0.672
infrastructure	1134	41.67	24.056	1	88
log_grp_head	1134	11.367	0.984	8.5366	14.221
oil	1134	0.1234	0.3291	0	1
ethnic	1134	0.77563	0.24566	0.0078	0.9727

2.5 Regression Results

This section presents and discusses evidence on the impact of a series of performance and loyalty related variables on the turnover of regional governors in Russia, for the time-period 1999 to 2012. While section 2.5.1 looks at the period when Russia's governors were elected in their regions (1999-2004), section 2.5.2 looks at the time-span when Russia's governors were appointed by the president (2005-2012). Section 2.5.3 then discusses some of the economic implications of the results.

2.5.1 Turnover under Gubernatorial Elections

Table 2.2 presents the effect of regional economic growth and personal economic performance on gubernatorial turnover. In order to compare results with the study conducted by Li and Zhou (2005) on provincial governors in China, the regression specification in table 2.2 is kept very similar to the one used by Li and Zhou in their paper (the only difference being that Li and Zhou use an additional control for education of provincial governors).

We see that for the period when governors were elected, both regional economic growth and regional growth weighted by the time a governor was in office do not seem to play a significant role in influencing the decisions of the regional electorate. Incentives for Russian governors under the electoral regime thus differ markedly from those faced by Chinese governors between 1978 and 1995, as in the study by Li and Zhou both growth indicators have a significant and positive effect on turnover.

Looking on table 2.4 in the appendix, we then see that other performance criteria also do not seem to significantly affect the decisions of regional electorates (although the signs for unemployment,

Table 2.2: Gubernatorial Turnover and Economic Growth, Ordered Probit Dependent variable: turnover (y = 0, 1, 2); robust standard errors; *** 1% significance level, ** 5% significance level, * 10% significance level; significant results marked bold; governor-specific controls (age, tenure, central, United Russia), regional controls (log GDP per capita, % of ethnic Russian population, oil dummy), time and regional dummies. Performance controls (infrastructure, inflation, unemployment, crime) have not been included in this specification, to get as close as possible to the specification used by Li and Zhou (2005).

	1999 - 2004		**2005 – 2012**	
	Elections		**Appointments**	
	1)	2)	3)	4)
Annual GDP growth	-0.227 (0.94)		-0.664 (1.39)	
Weighted GDP growth		0.274 (2.089)		-0.847 (2.057)
Governor-specific controls	yes	yes	yes	yes
Performance	no	no	no	no
Regional controls	yes	yes	yes	yes
Time / Region FE	yes	yes	yes	yes
Observations	486	486	648	648

	2005 - 2006		**2007 – 2012**	
	Appointments			
	5)	6)	7)	8)
Annual GDP growth	2.104 (5.122)		-1.647 (1.531)	
Weighted GDP growth		**104.81*** **(26.76)**		**-6.879*** **(2.658)**
Governor-specific controls	yes	yes	yes	yes
Performance	no	no	no	no
Regional controls	yes	yes	yes	yes
Time / Region FE	yes	yes	yes	yes
Observations	162	162	486	486

inflation and infrastructure quality in a given region point into a direction which suggests that better performance is at least to a certain degree taken into account by the electorate).

Table 2.3 reports the results for political loyalty. We see that election results for the Kremlin party and presidential candidate in national elections, as well as the degree to which national elections have been manipulated in a given region (table 2.4, appendix), have a negative impact on the probability of a governor to stay in office, although results for presidential elections are not significant. In other words, the worse United Russia is performing in a given region, and the less national elections are manipulated, the better are the chances of a governor to be re-elected.

On average, regional governors thus had no incentives to campaign for the Kremlin candidate and party, or to try to influence election results into a direction that benefited the Kremlin. Possibly, this might be one of the reasons why the Kremlin wanted to change the system of gubernatorial elections to one of gubernatorial appointments.

2.5.2 Turnover under Presidential Appointments

A first look on the period when governors were appointed (2005 to 2012, regressions 3 and 4 in tables 2.2 and 2.3, table 2.5 in the appendix) does not reveal a significant difference in incentives faced by governors, compared with the period when governors were elected. The two indicators for economic growth are still insignificant, although personal economic performance has now consistently a negative sign across all specifications. Presidential election results are now positive but not significant, whereas Duma election results are still negative but no longer significant. Only the degree of election irregularities has now become a positive and significant predictor of the probability of a governor to stay in office (table 2.5, appendix).

Table 2.3: Turnover, Growth and Political Loyalty under Elections (1999 - 2004) and Appointments (2005 - 2012), Ordered Probit

Dependent variable: turnover (y=0, 1, 2); robust standard errors; *** 1% significance level, ** 5% significance level, * 10% significance level; significant results marked bold; governor-specific controls (age, tenure, central, United Russia), performance controls (infrastructure, inflation, unemployment, crime), regional controls (log GDP per capita, % of ethnic Russian population, oil dummy), time and regional dummies.

	1999 - 2004		**2005 – 2012**	
	Elections		**Appointments**	
	1)	2)	3)	4)
Weighted GDP growth	-0.03 (2.227)	-0.213 (2.237)	-0.598 (2.116)	-0.468 (2.068)
Presidential elections	-0.364 (1.724)		1.153 (1.516)	
Duma elections		**-1.717*** **(0.974)**		-0.216 (1.181)
Governor	yes	yes	yes	yes
Performance	yes	yes	yes	yes
Regional controls	yes	yes	yes	yes
Time / Region FE	yes	yes	yes	yes
Observations	486	486	648	648

	2005 - 2006		**2007 – 2012**	
	Appointments			
	5)	6)	7)	8)
Weighted GDP growth	**111.24*** **(29.46)**	**111.24*** **(29.46)**	**-6.346**** **(2.713)**	**-6.346**** **(2.713)**
Presidential elections	**-183.68**** **(89.09)**		**36.08**** **(17.99)**	
Duma elections		**-80.22**** **(38.91)**		**28.92**** **(14.42)**
Governor	yes	yes	yes	yes
Performance	yes	yes	yes	yes
Regional controls	yes	yes	yes	yes
Time / Region FE	yes	yes	yes	yes
Observations	486	486	648	648

However, with the discussion from section 2.2 in mind, we know that the period from 2005 to 2012 can actually be divided into two distinct sub-periods. During the first two years after the reform (2005 and 2006), the Kremlin did not use any specific criteria to appoint or dismiss selected governors, but just reappointed every governor who appealed for presidential confirmation (Turovsky 2010).

Conducting a separate regression for the period 2005-2006 (regressions 5 and 6 in tables 2.2 and 2.3, table 2.6, appendix), we actually see that vote shares for the Kremlin candidate and party from the 2003/2004 election cycle have now a significant and negative effect on the probability of a governor to stay in office, while personal economic performance has a significant and positive effect. Interestingly, being a member of United Russia also negatively affects the probability of being reappointed during this period (see table 2.6, appendix).

As the Kremlin during this early post-reform period basically just re-confirmed election results of regional gubernatorial elections that took place in 2003 and 2004, this can be seen as another indication that the election mechanism worked against the interests of the presidential administration (at least with respect to gubernatorial electoral support for the Kremlin in national elections).

Finally, we look at the time-span when the presidential administration started in earnest to appoint and dismiss regional governors (regressions 7 and 8 in tables 2.2 and 2.3, table 2.7, appendix). For the period 2007 to 2012, the vote shares for the Kremlin candidate and for United Russia from the 2007/2008 election cycle have a strong, significant and positive effect on the probability of a governor to remain in office, as has the degree of election irregularities and membership in United Russia.

A probable interpretation of this result is that governors who actively used their position to deliver high election results for the Kremlin candidate and party (using the range of methods described in section 2.2) have been reappointed or promoted by the Kremlin, whereas governors who were unable or who refused to do so, as well as

governors who were not members of the ruling party, faced a higher probability of being dismissed by the president.

In contrast to the indicators measuring political loyalty, regional economic growth and personal economic performance of a governor have both a negative sign for the period. While annual regional economic growth is negative but not significant, the weighted average growth rate for the tenure of a governor has a significant negative effect on the probability to stay in office. In other words, the better a region has performed economically under a given governor, the worse are the governor's chances to stay in office or to be promoted.

We thus see that from 2007 onwards, although the institutional structure in Russia has become similar to the one in China (with personnel control being centralized, while economic management remains largely decentralized), the incentives faced by regional executives in both countries are directly opposed.

2.5.3 Turnover, Incentives and Regional Economic Performance

Assuming that it is in the interest of the Kremlin to appoint officials who are both politically loyal and economically competent, this paper thus finds evidence that a trade-off between political loyalty and economic performance does indeed exist. It seems that the ruling elites in Russia sacrifice regional economic development, at least to a certain degree, in order to consolidate their political control over the country.

What might be the mechanisms driving the results we find above? Ideally, it would certainly be in the interest of the Kremlin to appoint regional officials who are both able to deliver high vote shares and high rates of regional economic growth. However, for a number of reasons achieving the first objective might it make impossible to achieve the

second one, thus forcing the ruling elites in the centre to choose what signals to send to regional governors.

A first obvious reason is that the technologies used by regional governors to generate desired election outcomes have a direct negative effect on regional economic dynamism. Frye et al. (2012) have shown that regional officials extensively rely on employers to produce desired election results. They show that the time and effort invested by these firms to politically mobilize their workers are significant. This time and effort cannot be invested in productive activities, and thus constitutes a direct loss to a regional economy.

Moreover, they also show that the firms that are able to mobilize their workers at lowest cost are among the least dynamic in a region. It is reasonable to assume that in return for the political mobilization of their workers, these firms receive economic support by the regional governor, in the form of preferential treatment, government procurement contracts, subsidies or tax exemptions, even though economically it would make sense to support other firms that have a higher potential to contribute to regional economic growth. Apart from the direct static loss, mobilizing regional employers thus might also have a distortionary and dynamic negative effect on a regional economy.

In addition to relying on governors for mobilizing employers, we have also seen that the Kremlin increasingly appoints outsiders as regional governors to implement its policy objectives (see figure 2.2, section 2.4). In a recent study, Libman, Kozlov and Schultz (2012) have shown that these outsiders are more likely to behave in a predatory way than governors who stem from a given region. As outsiders mostly worked at high positions in the federal government prior to be appointed governor, they also have better chances to return to a high-level position in the centre when their turn as governors ends. They thus do not have to care as much for regional support as governors who have to continue their career in a given region after the end of their gubernatorial term, and thus face less inhibitions to act in a predatory way.

More specifically, Libman et al. (2012) find that while regions ruled by governors with higher outside options are characterized by more repressive behaviour of tax authorities, in these same regions tax authorities actually collect less additional revenues for the public budget. They explain this paradoxical finding by arguing that outsiders behave like 'roving bandits', in utilizing tax audits to establish control over regional companies, which they then use to extract private rents from these companies rather than revenues for the regional budget.

Additional evidence that predatory behaviour by regional state officials might be linked to the need to generate high election results is found by the study on corporate raiding in Russia presented in chapter 3. The study finds that regions where more firms are stolen from their legitimate owners by corrupt state agencies are also characterized by higher voting shares for the Kremlin party and candidate in national elections. I argue that a sort of quid-pro-quo mechanism might exist in these regions, with state agencies that are able to provide a sufficiently high level of electoral support for the ruling elites in the centre being allowed to participate in a certain degree of predatory activities.

Finally, one could also think that political loyalty in a given person might be negatively correlated with the ability to foster economic growth. This would be the argument made by Egorov and Sonin (2011), who maintain that rulers might want to hire loyal but mediocre subordinates, in order to mitigate the risk of being overthrown. However, in the case of Russian governors this argument does not seem to hold. In another recent study, Frye, Reuter and Buckley (2011) have examined the backgrounds of both elected and appointed Russian governors. They find that their backgrounds differ only to a small extent, and that appointed governors are actually more likely to hold a graduate degree, and to have some education in economics. If it is true that appointed governors pay less attention to economic development than to other objectives, this is thus most probably not caused by a lack of personal ability, but rather by the general incentive climate they are facing.

2.6 Conclusion

In a report published in 2012, the European Bank of Reconstruction and Development notes that Russia has been lagging behind other emerging economies in recent years with respect to economic diversification and dynamism, the role played by small and medium firms, skill formation, business environment and the number of exporting firms as a share of all firms (EBRD 2012). For a couple of indicators such as firm entry or the dependence of the economy on natural resource exports, the situation has actually worsened during the last decade (EBRD 2012, chapters 1 and 3).

This chapter provides some evidence why Russia might have lost some of its economic dynamism since the mid-2000s. The paper examines the change in incentives for Russian regional governors caused by a government reform in 2004, which replaced gubernatorial elections in Russia's regions with appointments of regional governors by the Russian president. I find that while under gubernatorial elections economic performance had an insignificant impact and political loyalty to the federal centre a negative impact on the probability of a governor to be re-elected, under presidential appointments (after an initial adjustment period from 2005 to 2006), economic performance had a negative impact on the probability of being reappointed, while political loyalty to the federal centre had a strong positive effect on the probability of a governor to be reappointed or promoted. In other words, since about 2007 Russian governors face strong incentives to demonstrate their political loyalty by delivering electoral support for the Kremlin, while their economic performance has actually a negative effect on their chances to remain in office.

Since the reform in 2004, the set-up of federal institutions in Russia has started to resemble the federal structure introduced in China under Deng Xiaoping in the early 1980s. In both countries, regional governors are appointed by the federal centre, while they remain relatively free to conduct the economic policy they want in their respective regions. To

make the results of this study comparable with results of a similar study on Chinese governors by Li and Zhou (2005), the model and specification used in this paper have been kept as similar as possible to the ones introduced by Li and Zhou (2005). However, while Li and Zhou find that economic performance has a strong and positive effect on the probability of Chinese governors to remain in office or to be promoted, this paper finds an opposite incentive structure for Russia. The study thus also shows that similar institutional structures can produce very different outcomes, depending on the signals send by the federal centre and the incentive structure in place.

2.7 References

[1] Alesina A., Tabellini G. (2007), Bureaucrats or Politicians? Part I: A Single Policy Task, *American Economic Review*, 97(1), 169-179

[2] Alesina A., Tabellini G. (2008), Bureaucrats or Politicians? Part II: Multiple Policy Tasks, *Journal of Public Economics*, 92(3/4), 426-447

[3] Bacon E. (2012), Electoral Manipulation and the Development of Russia's Political System, *Europe-Asia Studies*, 28(2), 105-118

[4] Besley T., Coate S. (2003), Elected Versus Appointed Regulators: Theory and Evidence, *Journal of the European Economic Association,* 1(5), 1176-1206

[5] Bilev G. (2011), 89 Russias: The Role of Formal Institutions in Explaining Executive Contestation, *APSA 2011 Annual Meeting Paper*

[6] Blakkisrud (2011), Medvedev's New Governors, *Europe-Asia Studies*, 63(3), 367-395

[7] Bo Z. (1996), Economic Performance and Political Mobility: Chinese Provincial Leaders, *Journal of Contemporary China*, 5(12), 135-154

[8] Bo Z. (2002), Chinese Provincial Leaders: Economic Performance and Political Mobility since 1949, *M.E. Sharpe*, Armonk, NY

[9] Chebankova E. (2005), The Limitations of Central Authority in the Regions and the Implications for the Evolution of Russia's Federal System, *Europe-Asia Studies*, 57(7), 933-949

[10] Chebankova E. (2006), The Unintended Consequences of Gubernatorial Appointments in Russia, 2005-6, *Journal of Communist Studies and Transition Politics,* 22(4), 457-484

[11] Duncan, P. (2013), Russia, the West and the 2007-2008 Electoral Cycle: Did the Kremlin Really Fear a 'Coloured Revolution' ?, *Europe-Asia Studies*, 65(1), 1-25

[12] Easter G. (1997), Redefining Centre-Regional Relations in the Russian Federation: Sverdlovsk Oblast, *Europe-Asia Studies*, 49(4), 617-635

[13] EBRD (2012), Diversifying Russia: Harnessing Regional Diversity, *European Bank for Reconstruction and Development*, London

[14] Egorov G., Sonin K. (2011), Dictators and their Vizirs: Endogenizing the Loyalty-Competence Trade-Off, *Journal of the European Economic Association*, 9(5), 903-930

[15] Evans P., Rauch J. (1999), Bureaucracy and Growth: A Cross-National Analysis of the Effects of "Weberian" State Structures on Economic Growth, *American Sociological Review*, 64(5), 748-765

[16] Frye T., Reuter O., Buckley N. (2011), The Political Economy of Russian Gubernatorial Election and Appointment, *working paper BRP 01/PS/2011*, Higher School of Economics, Moscow

[17] Frye T., Reuter O., Szakonyi (2012), Political Machines at Work: Voter Mobilization and Electoral Subversion in the Workplace, *working paper BRP 08/PS/2012*, Higher School of Economics, Moscow

[18] Gandhi J., Lust-Okar E. (2009), Elections under Authoritarianism, *Annual Review of Political Science*, 12, 403-422

[19] Gelman V. (2010), The Dynamics of Subnational Authoritarianism, *Russian Politics and Law*, 48(2), 7-26

[20] Goode J.P. (2007), The Puzzle of Putin's Gubernatorial Appointments, *Europe-Asia Studies*, 59(3), 365-399

[21] Hale H. (2003), Explaining Machine Politics in Russia's Regions: Economy, Ethnicity, and Legacy, *Post-Soviet Affairs*, 19(3), 228-263

[22] Iaryczower M., Lewis G., Shum M. (2013), To Elect or to Appoint? Bias, Information, and Responsiveness of Bureaucrats and Politicians, *Journal of Public Economics*, 97, 230-244

[23] Jones B., Olken B. (2005), Do Leaders Matter? National Leadership and Growth Since WW II, *The Quarterly Journal of Economics*, 120(3), 835-864

[24] Konitzer A. (2006), Voting for Russia's Governors: Regional Elections and Accountability under Yeltsin and Putin, *The John Hopkins University Press*, Baltimore

[25] Landry P. (2008), Decentralized Authoritarianism in China: The Communist Party's Control of Local Elites in the Post-Mao Era, *Cambridge University Press*, New York

[26] Levitsky S., Way L. (2002), The Rise of Competitive Authoritarianism, *Journal of Democracy*, 13(2), 51-65

[27] Li D. (1998), Changing Incentives of the Chinese Bureaucracy, *American Economic Review*, 88(2), 393-397

[28] Li H., Zhou L. (2005), Political Turnover and Economic Performance: The Incentive Role of Personnel Control in China, *Journal of Public Economics*, 89, 1743-1762

[29] Libman A., Kozlov V., Schultz A. (2012), Roving Bandits in Action: Outside Option and Governmental Predation in Autocracies, *Kyklos*, 65(4), 526-562

[30] Magaloni B. (2008), Credible Power-Sharing and the Longevity of Authoritarian Rule, *Comparative Political Studies*, 41(4/5), 715-741

[31] Maskin E., Tirole J. (2004), The Politician and the Judge: Accountability in Government, *American Economic Review*, 94(4), 1034-1054

[32] Mendras M. (1999), How Regional Elites Preserve their Power, *Post-Soviet Affairs*, 15(4), 295-311

[33] Mendras M. (2012), Russian Politics: The Paradox of a Weak State, *C Hurst & Co*, London

[34] Myagkov M., Ordeshook P., Shakin D. (2009), The Forensics of Election Fraud: Russia and Ukraine, *Cambridge University Press*, New York

[35] Nye J., Vasilyeva O. (2012), Does Political Competition Matter for Public Goods Provision? - Evidence from Russian Regions, *George Mason University Working Paper in Economics No. 12-55*

[36] Oreshkin D. (2007), Vybory i Geographiya Administrativogo Resursa [Elections and the Geography of 'Administrative Resources'], Geography Institute of the Russian Academy of Sciences; an abridged version of the study was published in *Novaya Gazeta*, November 11th, 2007

[37] Orttung R. (2004), Business and Politics in the Russian Regions, *Problems of Post-Communism*, 51(2), 48-60

[38] Reisinger W., Moraski B. (2009), Regional Voting in Russia's Federal Elections and Changing Regional Deference to the Kremlin, *conference paper*, 67th Annual National Conference of the Midwest Political Science Association

[39] Reisinger W., Moraski B. (2011), Skill or Loyalty? The Fate of Russia's Governors Under Presidential Control, *mimeo*

[40] Reuter O. (2010), The Politics of Dominant Party Formation: United Russia and Russia's Governors, *Europe-Asia Studies*, 62(2), 293-327

[41] Reuter O., Gandhi J. (2010), Economic Performance and Elite Defection from Hegemonic Parties, *British Journal of Political Science*, 41(1), 83-110

[42] Reuter O., Remington T. (2009), Dominant Party Regimes and the Commitment Problem: The Case of United Russia, *Comparative Political Studies*, 42(4), 501-526

[43] Reuter O., Robertson G. (2012), Subnational Appointments in Authoritarian Regimes: Evidence from Russian Gubernatorial Appointments, *The Journal of Politics*, 74(4), 1023-1037

[44] Reuter O., Turovsky R. (2012), Dominant Party Rule and Legislative Leadership in Authoritarian Regimes, , forthcoming

[45] Ross C. (2010), Federalism and Inter-Governmental Relations in Russia, *Journal of Communist Studies and Transition Politics*, 26(2), 165-187

[46] Sharafutdinova G. (2010), Subnational Governance in Russia: How Putin Changed the Contract with his Agents and the Problems it Created for Medvedev, *Publius: The Journal of Federalism*, 40(4), 672-696

[47] Shih V., Adolph C., Liu M. (2012), Getting Ahead in the Communist Party: Explaining the Advancement of Central Committee Members in China, *American Political Science Review*, 106(1), 166-187

[48] Stoner-Weiss, K. (1999), Central Weakness and Provincial Autonomy: Observations on the Devolution Process in Russia, *Post-Soviet Affairs*, 15(1), 87-106

[49] Stoner-Weiss, K. (2002), Local Heroes: The Political Economy of Russian Regional Governance, *Princeton University Press*, Princeton

[50] Svolik M. (2012), The Politics of Authoritarian Rule, *Cambridge University Press*, Cambridge

[51] Tkacheva O. (2008), Governors as Poster-Candidates in Russia's Legislative Elections, 2003 - 2008, *mimeo*, University of Michigan

[52] Turovsky R. (2010), How Russian Governors Are Appointed, *Russian Politics and Law*, 48(1), 58-79

[53] Wagner A. (2011), Loyalty and Competence in Public Agencies, *Public Choice*, 146(1/2), 145-162

[54] Wegren S., Konitzer A. (2007), Prospects for Managed Democracy in Russia, *Europe-Asia Studies*, 59(6), 1025-1047

[55] Wooldridge J. (2002), Econometric Analysis of Cross-Section and Panel Data, *MIT Press*, Cambridge, MA

[56] Yao Y., Zhang M. (2012), Subnational Leaders and Economic Growth, *working paper*, China Center for Economic Research, Peking University

[57] Zheng S., Kahn M., Sun W., Luo D. (2012), Urban Political Accountability in China: Implications for Energy Efficiency and Pollution Levels, *working paper*

[58] Zubarevich N. (2005), Big Business in Russia's Regions and its Role in the Federal Reform, *in Reddaway, P. and Orttung R. (eds.)*, The Dynamics of Russian Politics: Putin's Reform of Federal-Regional Relations, vol. 2, Rowman & Littlefield, Lanham, MD

2.8 Appendix

Table 2.4: Turnover and Elections, Ordered Probit, 1999 – 2004

	Dependent variable: turnover (y=0, 1, 2); robust standard errors; *** 1% significance level, ** 5% significance level, * 10% significance level; significant results marked bold.				
	1)	2)	3)	4)	5)
Annual GDP growth	-0.227				
	(0.94)				
Weighted GDP growth		0.274	-0.03	-0.213	0.056
		(2.089)	(2.227)	(2.237)	(2.211)
Pres. elections ('00 & '04)			-0.364		
			(1.724)		
Duma elections ('99 & '03)				**-1.717***	
				(0.974)	
Election irregularities					-1.832
					(1.188)
Age	-0.03	-0.03	-0.031	-0.031	-0.031
	(0.022)	(0.023)	(0.024)	(0.024)	(0.023)
Tenure	**-0.176*** **	**-0.175*** **	**-0.174*** **	**-0.172*** **	**-0.179*** **
	(0.044)	**(0.043)**	**(0.045)**	**(0.045)**	**(0.044)**
Central	-0.208	-0.221	-0.299	-0.298	-0.28
	(0.463)	(0.477)	(0.497)	(0.499)	(0.486)
United Russia	0.28	0.283	0.284	0.286	0.224
	(0.246)	(0.245)	(0.249)	(0.249)	(0.247)
Unemployment			-1.34	-1.159	-1.318
			(1.041)	(1.042)	(1.034)
Crime rate			0.0004	0.0004	0.0004
			(0.0003)	(0.0003)	(0.0003)
Inflation			-2.71	-2.749	-2.733
			(1.783)	(1.781)	(1.728)
Infrastructure			-0.006	-0.0007	-0.004
			(0.027)	(0.027)	(0.026)
Log GDP per capita	0.935	0.828	0.67	0.71	0.835
	(0.698)	(0.734)	(0.796)	(0.789)	(0.749)
Ethnic	**377.67***	**384.96***	289.98	267.7	30.524
	(219.48)	**(219.99)**	(242.69)	(240.95)	(97.811)
Oil	**126.19***	**128.92***	97.14	88.98	11.725
	(75.35)	**(75.56)**	(83.94)	(83.39)	(36.35)
Time FE	yes	yes	yes	yes	yes
Region FE	yes	yes	yes	yes	yes
Observations	486	486	486	486	486

Table 2.5: Turnover and Appointments, Ordered Probit, 2005 – 2012

	Dependent variable: turnover (y=0, 1, 2); robust standard errors; *** 1% significance level, ** 5% significance level, * 10% significance level; significant results marked bold.				
	1)	2)	3)	4)	5)
Weighted GDP growth	-0.598	-0.468	-0.494	-0.494	-0.494
	(2.116)	(2.068)	(2.094)	(2.094)	(2.094)
Pres. elections ('04 & '08)	1.153				
	(1.516)				
Duma elections ('03 & '07)		-0.216			
		(1.181)			
Pres. elections (2004)			**-34.375***		
			(18.049)		
Duma elections (2003)				**-15.013***	
				(7.883)	
Election irregularities					**1.318****
					(0.692)
Age	**-0.036*****	**-0.036*****	**-0.036*****	**-0.036*****	**-0.036*****
	(0.014)	**(0.014)**	**(0.014)**	**(0.014)**	**(0.014)**
Tenure	-0.012	-0.01	-0.011	-0.011	-0.011
	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)
Central	0.367	0.36	0.364	0.364	0.364
	(0.256)	(0.257)	(0.256)	(0.256)	(0.256)
United Russia	**0.42***	**0.429***	**0.425***	**0.425***	**0.425***
	(0.226)	**(0.226)**	**(0.226)**	**(0.226)**	**(0.226)**
Unemployment	4.917	4.673	4.728	4.728	4.28
	(3.487)	(3.51)	(3.496)	(3.496)	(3.536)
Crime rate	0.0002	0.0001	0.0001	0.0001	0.0001
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Inflation	1.437	1.296	1.351	1.351	1.351
	(3.577)	(3.57)	(3.578)	(3.578)	(3.578)
Infrastructure	0.003	0.003	0.004	0.004	0.004
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
Log GDP per capita	**2.161*****	**2.165*****	**2.159*****	**2.159*****	**2.159*****
	(0.639)	**(0.641)**	**(0.64)**	**(0.64)**	**(0.64)**
Ethnic	**-246.8****	**-248.7****	157.86	65.08	-45.27
	(123.3)	**(123.1)**	(109.7)	(68.8)	(47.08)
Oil	**-88.53****	**-88.95****	54.9	19.95	-21.95
	(42.44)	**(42.36)**	(40.18)	(24.71)	(17.13)
Time FE	yes	yes	yes	yes	yes
Region FE	yes	yes	yes	yes	yes
Observations	648	648	648	648	648

Table 2.6: Turnover and Appointments, Ordered Probit, 2005 – 2006

	Dependent variable: turnover (y=0, 1, 2); robust standard errors; *** 1% significance level, ** 5% significance level, * 10% significance level; significant results marked bold.				
	1)	2)	3)	4)	5)
Annual GDP growth	2.104				
	(5.122)				
Weighted GDP growth		**104.81*** **	**111.24*** **	**111.24*** **	**111.24*** **
		(26.76)	**(29.46)**	**(29.46)**	**(29.46)**
Pres. elections (2004)			**-183.68** **		
			(89.09)		
Duma elections (2003)				**-80.22** **	
				(38.91)	
Election irregularities					**7.043** **
					(3.416)
Age	**-0.243*** **	**-0.519*** **	**-0.556*** **	**-0.556*** **	**-0.556*** **
	(0.061)	**(0.084)**	**(0.092)**	**(0.092)**	**(0.092)**
Tenure	**-0.142**	**0.352*** **	**0.374*** **	**0.374*** **	**0.374*** **
	(0.098)	**(0.11)**	**(0.135)**	**(0.135)**	**(0.135)**
Central	**8.749*** **	**5.471*** **	**5.284*** **	**5.284*** **	**5.284*** **
	(0.707)	**(1.289)**	**(1.576)**	**(1.576)**	**(1.576)**
United Russia	-1.113	**-1.473** **	**-1.485** **	**-1.485** **	**-1.485** **
	(0.7)	**(0.592)**	**(0.734)**	**(0.734)**	**(0.734)**
Unemployment			-11.43	-11.43	-11.43
			(21.1)	(21.1)	(21.1)
Crime rate			-0.0005	-0.0005	-0.0005
			(0.001)	(0.001)	(0.001)
Inflation			14.66	14.66	14.66
			(9.88)	(9.88)	(9.88)
Infrastructure			0.021	0.021	0.021
			(0.048)	(0.048)	(0.048)
Log GDP per capita	1.014	-3.086	-2.001	-2.001	-2.001
	(5.979)	(6.592)	(5.381)	(5.381)	(5.381)
Ethnic	2.519	-959.1	**980.5*** **	**179.23** **	-104.85
	(713.1)	(685.6)	**(368.7)**	**(71.35)**	(254.79)
Oil	-0.238	-319.5	**365.88*** **	**484.78*** **	-44.68
	(256.3)	(247.6)	**(137.44)**	**(186.46)**	(100.83)
Time FE	yes	yes	yes	yes	yes
Region FE	yes	yes	yes	yes	yes
Observations	162	162	162	162	162

Table 2.7: Turnover and Appointments, Ordered Probit, 2007 – 2012

	Dependent variable: turnover (y=0, 1, 2); robust standard errors; *** 1% significance level, ** 5% significance level, * 10% significance level; significant results marked bold.				
	1)	2)	3)	4)	5)
Annual GDP growth	-1.647				
	(1.531)				
Weighted GDP growth		**-6.879*** **	**-6.346** **	**-6.346** **	**-6.346** **
		(2.658)	**(2.713)**	**(2.713)**	**(2.713)**
Pres. elections (2008)			**36.08** **		
			(17.99)		
Duma elections (2007)				**28.92** **	
				(14.42)	
Election irregularities					**1.667** **
					(0.831)
Age	-0.022	-0.018	-0.021	-0.021	-0.021
	(0.018)	(0.019)	(0.0197)	(0.0197)	(0.0197)
Tenure	**-0.056** **	**-0.052** **	**-0.051** **	**-0.051** **	**-0.051** **
	(0.022)	**(0.023)**	**(0.023)**	**(0.023)**	**(0.023)**
Central	0.426	0.394	0.384	0.384	0.384
	(0.337)	(0.333)	(0.328)	(0.328)	(0.328)
United Russia	**0.722** **	**0.658** **	**0.689** **	**0.689** **	**0.689** **
	(0.306)	**(0.307)**	**(0.309)**	**(0.309)**	**(0.309)**
Unemployment			5.887	5.887	5.887
			(4.686)	(4.686)	(4.686)
Crime rate			-0.00006	-0.00006	-0.00006
			(0.0005)	(0.0005)	(0.0005)
Inflation			-2.65	-2.65	-2.65
			(4.796)	(4.796)	(4.796)
Infrastructure			-0.006	-0.006	-0.006
			(0.016)	(0.016)	(0.016)
Log GDP per capita	**2.874** **	**2.989*** **	**3.126*** **	**3.126*** **	**3.126*** **
	(1.13)	**(1.097)**	**(1.101)**	**(1.101)**	**(1.101)**
Ethnic	-245.04	**-261.1***	-32.54	-54.48	16.53
	(152.0)	**(147.4)**	(71.6)	(77.68)	(62.99)
Oil	**-89.106***	**-94.5***	-23.6	-31.381	-2.8
	(52.75)	**(51.2)**	(27.6)	(30.05)	(23.12)
Time FE	yes	yes	yes	yes	Yes
Region FE	yes	yes	yes	yes	Yes
Observations	486	486	486	486	486

Chapter 3

Corporate Raiding and the Role of the State in Russia

3.1 Introduction

Imagine being a young innovative entrepreneur in Russia. A couple of years ago, you had a brilliant idea, you were able to get some money, which permitted you to start a business. The business began to grow, with your company eventually becoming one of the leaders in its field. Until one morning, access to your office is denied by a group of armed people in black uniforms. A sleek lawyer presents you with a document stating that you no longer own your business. The document is evidently a forgery, but it contains the official seal of a local judge. You call the police, but after viewing the document an officer confirms that the document is legal. The officer then asks you to kindly leave the company premises, as you no longer own the firm. Outraged, you start a legal battle to get your business back. But procedures are long and protracted, and although finally a court acknowledges that the document was indeed a forgery, in the meantime your company has been dismantled, its assets sold off, and the group carrying out the raid has disappeared. Although you are still young and innovative, you will now think twice before starting a new business.

During the last 15 years, this has been a common situation for many Russian entrepreneurs. While only a couple of high-profile cases have made it into the Western press, inside Russia the problem of corporate raiding (reiderstvo) has received widespread attention. The issue has been widely discussed in regional and national Russian newspapers, as

well as in the popular media, with numerous novels, TV series and movies about raiding being published and produced in recent years[21]. Leading observers of the Russian economy have underlined its importance, with Elena Zhuravskaya (2008, page 2) calling corporate raiding "the problem most acute, urgent and illustrative of the present state of affairs" in Russia today.

Corporate raiding in Russia is a distinctive phenomenon, not to be confounded with hostile takeovers elsewhere. Unlike hostile takeovers in the West, corporate raids in Russia are characterised by the use of illegal methods, such as blackmail, bribery, forged documents, and the use of armed groups to enforce change of ownership. A further central point is the close involvement of corrupt government agencies, both as active supporters of raider groups, and as initiators of raiding attacks themselves. From an economic perspective, most observers agree that the economic effects of corporate raiding in Russia are negative, in contrast to the often efficiency-enhancing effects of takeovers elsewhere in the world. In Russia, the story goes, firms are attacked and taken over not for productive purposes, but for short-term profits, with companies being dismantled and assets sold off after a raid has been successfully carried out. Apart from the direct negative effects on attacked companies, this also contributes to a negative business climate in general. If entrepreneurs have to fear that their firm is stolen once they are successful, they are less inclined to start a business and to invest in the first place.

Corporate raiding is the latest distinctive stage in the history of the fight for property in Russia's economic transition. Volkov (2004) identifies three different stages of property re-distribution before 1998. After covert insider privatization threatened to get out of hand (1988-1991), the reformers initiated privatization by vouchers (1992-1994), which was then followed by the infamous loans-for-shares schemes

[21] For example, *Ochota na Isubrja* (1999) and *Promsona* (2003) by Yulia Latynina, *Reider* (2007) by Pavel Astachov, or *Anti-Reider* (2008) and *Millioner* (2010) by Sergei Sergeyev. *Ochota na Isubrja*, about the takeover of a steel plant in Siberia, was made into a TV series in 2005, and *Reider* into a movie in 2011.

around the time of Boris Yeltsin's re-election (1995-1996). By 1997, the Russian state had privatized a large percentage of its assets, which had been acquired mostly by insiders and a small group of profiteers that smartly navigated the different stages of privatization, the so-called oligarchs (Barnes 2006).

Facilitated by a change in Russia's bankruptcy law in 1998, it was at this point that corporate raiding started in Russia (Volkov 2004, Radygin 2010). Those who had been left outside until now started trying to get a share of the pie, while some of the leading oligarchs tried to consolidate and round-up their possessions with the use of illegal takeover attacks. Increasingly, various state-agencies then also started to participate in the fight for property, first as facilitators of raiding attacks, and then by grabbing attractive assets out of their own initiative. Although the methods, characteristics and main protagonists of raiding attacks have changed over time, since the late 1990s until today corporate raiding has remained a central feature of corporate conflict and state-business relations in Russia.

Considering the central importance of the topic to understand Russia's economy during the 2000s, its treatment in the literature has remained relatively limited to date. A number of descriptive studies provide an overall account of raiding in Russia. Volkov (2004), Firestone (2008), Zhuravskaya (2008), Carbonell (2009), Settles (2009), Sakwa (2011) and Osipian (2012) focus on a couple of high-profile cases to highlight the characteristics, methods, determinants and economic consequences of raiding attacks. Kireev (2007) and Radygin (2010) look more specifically on the market for corporate control in Russia, while Woodruff (2004) and Firestone (2010) examine the legal side of the problem. Demidova (2007) and Markus (2012) look on preventive measures and possible defenses against raiding, whereas Kapeliushnikov et al. (2012) and Dzarasov (2011) try to quantitatively measure the economic effects of insecure property rights in Russia. Finally, Privalov and Volkov (2007), Aldabergenova (2010), Volkov et al. (2010), Gans-Morse (2012) and Yakovlev, Baranov and Nazrullaeva (2013) look on the involvement of state agencies and the role of the state.

While these studies provide important insights, a number of central questions have not yet been addressed. Although there is a general consensus that corporate raiding has been a major problem of the Russian economy in the 2000s, estimates about the actual extent of the phenomenon vary widely (see table 3.3, appendix). Most estimates cited in the literature are subjective evaluations made by officials and experts in newspaper interviews. Apart from a short study by Zhang (2010)[22], there is no quantitative evidence about the real number of raider attacks or about a possible evolution in the number of cases over time. While there seems to be a consensus in the literature that the number of attacks per year might easily be situated in the hundreds or even thousands, no solid evidence for this exists. As there has been a recent tendency in the Russian media to call all types of corporate conflict in Russia "reiderstvo" (Sakwa 2011), the actual number of attacks might also be lower than expected.

Evidence about the nature and characteristics of the firms attacked, the raiders themselves, the prevalence of raiding in different regions and the extent to which state agencies are involved remains also largely anecdotal to date. While a handful of cases have been widely covered, a genuine understanding of the phenomenon of corporate raiding would require an analysis based on a broader sample. Such a sample would also permit to have a look at the deeper determinants of *reiderstvo* in Russia, especially with respect to the growing role played by regional state agencies and the central state.

In this paper, I attempt to provide an analysis based on a broader sample of cases. As official information about corporate raiding in Russia does either not exist, or is not publicly available, I base my study on a comprehensive search for cases that have been mentioned in Russian newspaper articles. Using the online-archive *Integrum*[23], a strict definition of corporate raiding, and looking for at least two

[22] Zhang, using a number of different sources, assembles a sample of 97 major takeover cases between 1992 and 2005.

[23] A database containing all national and regional newspapers in Russia, www.integrum.ru.

independent sources per case, I was able to compile a new dataset of 312 cases that have occurred between 1999 and 2010.

The dataset permits a more in-depth treatment of the topic than has previously been possible. I am able to identify a shift over time both in the regions and in the sectors affected by raiding attacks. The dataset also permits to show that corrupt state agencies have indeed become increasingly involved in the illegal grabbing of economic assets, especially from the year 2003 onwards.

Having more substantive evidence for the increasing involvement of state agencies makes it possible to place this study into the wider literature on predatory state agencies in transition economies and authoritarian regimes. In a classic paper, Frye and Shleifer (1997) describe how government agencies in transition countries might act with a grabbing, helping or invisible hand. In another classic study, Olson (1993) distinguishes between roving and stationary bandits, arguing that a ruler with some attachment to a given territory will be less inclined to act in a predatory way. Libman, Kozlov and Schultz (2012) apply this framework to Russia, showing empirically that governors with no prior links to a given region are more likely to act in a predatory way, by increasing the repressiveness of regional tax agencies in order to collect private rents.

Furthermore, the study also relates to the literature on patron-client and principal-agent relationships in authoritarian regimes (see e.g. Egorov and Sonin 2011), the literature on electoral authoritarian regimes (Gandhi and Lust-Oskar 2009; Frye, Reuter, Szakonyi 2011), as well as to the literature on potential political loyalty – economic performance trade-offs in such contexts (see e.g. Reisinger and Moraski 2011, and chapter 2 above).

Building on this literature, I try to examine in the second part of this chapter why state-agencies in Russia have become increasingly involved in illegal corporate raiding activities over time. Using a fixed-effects panel model to look at the determinants of raiding attacks in Russian regions, I find that election results for the Kremlin party

United Russia in Duma elections and for the Kremlin candidate in presidential elections, as well as the degree to which elections have been manipulated in Russia's regions, are significantly and positively correlated with the number of raiding attacks in a given region. On the other hand, various indicators measuring the attachment of a regional governor to his or her region are negative predictors of the number of raiding attacks that took place in the region.

In chapter 2, I have presented evidence that a trade-off between economic performance and political loyalty might exist in Russia, from the time on when regional governors were appointed by the president. Based on the results found in this study, I now develop this line of thought further. I now argue that a kind of quid-pro-quo mechanism might have formed itself in Russian regions, especially from the time when regional administrations were directly appointed by the presidential administration (i.e. when they were no longer accountable to the regional electorate). Thus, as long as regional state agencies are able to provide a sufficiently high level of electoral support for the ruling elites in the centre, it is conceivable that the central state might in turn tolerate a certain degree of predatory activities by regional elites.

My results present additional evidence confirming the results obtained by Libman, Kozlov and Schultz (2012), in showing that regions with governors that have stronger ties to their region are characterized by a lower level of predatory activities by local state agencies. The results also fit and illustrate the argument advanced by Olson (1993) about stationary and roving bandits.

The chapter is organized as follows. Section 2 presents the dataset and the methodology used for data collection. Section 3 describes more in detail the phenomenon of corporate raiding in Russia, and looks on the distribution of attacks across time, regions and sectors. Section 4 presents the econometric specification, section 5 the regression results, and section 6 concludes.

3.2 Data

Until the introduction of a federal law on corporate raiding in July 2010[24], no official statistics on raiding did exist in Russia. In the comparatively rare cases that raiders were convicted, this was done under standard corporate law, making it difficult to distinguish raiding cases from other cases in criminal statistics. Estimates about the overall number of cases that are cited in the literature are mostly based on the subjective opinion of experts, politicians and officials, and vary widely (see table 3.3, appendix). To my knowledge, no reliable aggregate information exists to date about the number of raiding attacks carried out each year in Russia, and their regional distribution.

The only available information that I am aware of is information present in news reports and newspaper articles about raiding attacks. In this study, I therefore undertake a systematic analysis of Russian newspaper archives, to assemble a dataset about raiding that is as complete, representative and random as possible, given the limitations on data availability described above.

To access newspaper archives, I used the online database "Integrum" (www.integrum.ru), a comprehensive database of all Russian national and regional newspapers archives (2441 different media in total). I searched the archives with the use of different keywords for articles about illegal corporate takeovers and raider attacks[25], ending the search when no new relevant articles appeared for each keyword. For each reference to an attack, I checked if the attack was compatible with a strict definition of *illegal* corporate raiding. A case was only added to

[24] Composed of a number of amendments and extensions to existing law, i.a. to Federal Law No. 147-FZ, "On Natural Monopolies".

[25] Keywords used are reider, reiderstvo, reiderskii sachvat, korporativnii sachvat, nedrushestvenoe poglashenie, peredel sobstvennosti, sakasenoe bankrotstvo, i.e. raider, raider attack, raider takeover, corporate takeover, hostile takeover, property redistribution, ordered bankruptcy. Archives were accessed between November 2011 and February 2012.

the dataset if two independent sources clearly confirmed that illegal methods (e.g. blackmail, bribery, forged documents or the use of physical force through armed groups or bribed police officers) were used in an attempted or successful attack on a given firm. The objective of the attack had to be a partial or complete transfer of property from the initial owners to the attackers. Moreover, the information also had to be detailed enough to permit the clear identification of the year the attack occurred, of the firm attacked, and of the attack's precise location.

Altogether, I was able to identify 312 cases of corporate raiding for the period 1999 to 2010, based on evidence from approximately 1500 newspaper articles. For each case, I checked if the illegal involvement of state agencies was mentioned, either in support of raiders, or as initiators of the raid themselves. If state-involvement was mentioned, I grouped it according to five categories, i.e. involvement by the security services, the tax service, courts and the legal system, any kind of regulatory control agency (e.g. fire security), and local and regional administrations. Finally, I also retrieved financial and corporate information for each attacked company from the company database ORBIS (copyright BvD). This was done to get some idea about the size, type and importance of target companies. Detailed corporate information was available for 216 of the 312 firms in my sample.

It is obvious that information collected from newspaper archives comes with a number of shortcomings. On the one hand, only a limited number of cases might find their way into newspapers, as raiders are inclined to keep their activity secret, and local officials might try to prevent the publication of incriminating information. Furthermore, reporting on economic crimes is inherently risky, especially in a country like Russia where 106 journalists have been murdered between 1999 and 2010[26]. Thus, it is quite possible that the real number of cases is a multiple of the number of cases that can be found in the press.

[26] "Journalists in Russia" database, http://journalists-in-russia.org/.

On the other hand, attacked businessmen have increasingly tried to make their cases public, as part of a strategy of defense. In addition, a number of local business associations[27] have started to publicize information about raider attacks and about the predatory behaviour of state agencies. While this might imply that information on raider attacks in the press is favourably biased towards the interests of attacked entrepreneurs, it at least means that information is made available at all.

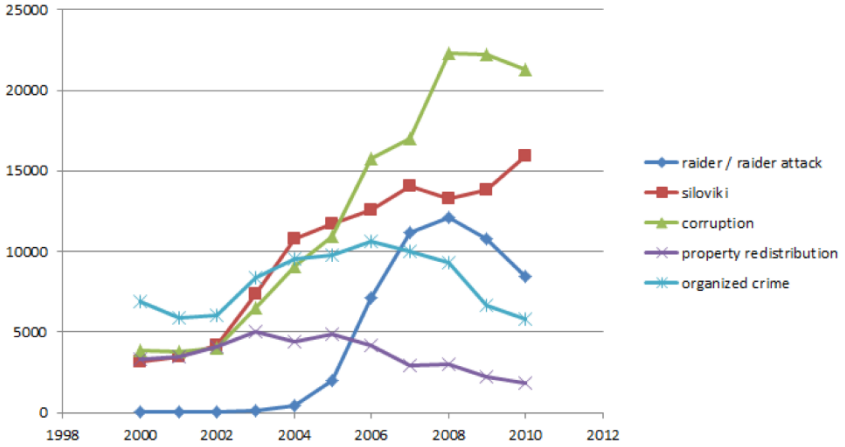
While not fully free, the Russian print media is still more independent than the televised media in the country, with a number of regional and national newspapers actively discussing sensitive issues. Looking at a frequency analysis of mentions in all Russian national and regional newspapers, it seems that at least from 2004 onwards, the issue of corporate raiding has been relatively widely discussed in the Russian press.

Figure 3.1 shows that while the number of times terms such as "organized crime" and "property redistribution" (characteristic for Russia in the 1990s) were mentioned remained stable throughout the 2000s, the number of mentions for terms such as "corporate raiding", "corruption" and "siloviki" ("silovik" being a Russian word used to describe politicians from the security and military services, with a large proportion of Vladimir Putin's close associates being siloviki[28]) increased significantly during the same period. Apart from showing that newspapers in Russia do discuss the issue of corporate raiding, the simultaneous increase in newspaper mentions for "siloviki", "corruption" and a bit later "raider attack" also suggests that both issues might be somehow connected.

[27] An example is the NGO "Business Solidarity" (Бизнес Солидарность), founded by entrepreneur Yana Yakovlevna (www.kapitalisty.ru).

[28] See e.g. Kryshtanovskaya and White (2003, 2009).

Figure 3.1: Terms mentioned in Russian national and regional newspapers (number of mentions / year; source: Integrum, www.integrum.ru)



An obvious problem concerning newspaper reports on economic crime in Russia is the possibility that newspaper articles might have been bought or fabricated by one party to attack or slander a competitor or opponent. I try to address this issue in reporting a case only if at least two independent sources describe the same attack.

However, as the ownership and control structure of Russian newspapers (especially of regional newspapers) is very opaque, this remains a serious problem, as it is very difficult to determine if two different newspapers are indeed independent. I therefore tried to apply common sense in deciding whether a reported case indeed describes an attack, or whether the description could have been fabricated to harm a specific party.

A final issue concerning data quality is the risk of information being geographically biased, as the likelihood of newspapers reporting raiding attacks might differ from region to region. In the empirical part

of this study, I try to address this problem by including a control for the degree of media freedom in my regressions (see section 3.4 and 3.5).

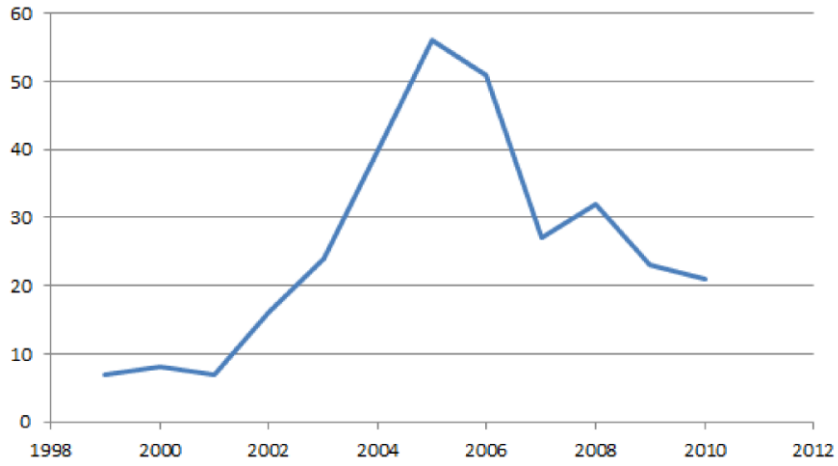
We thus see that newspaper archives are far from providing a perfect source of information on illegal corporate raiding attacks in Russia. However, the information I was able to identify using this method is most probably still much richer and more detailed than all other information publicly available on the topic to date. I also believe that the dataset is sufficiently large and random and presents sufficient variation to make at least a certain amount of inference about various patterns of corporate raiding in Russia possible. Finally, I also believe that the information included in the roughly 1500 articles that I read and analysed for this study is rich enough to provide a relatively clear descriptive picture of the phenomenon of corporate raiding under Putin. The next section is thus giving a range of descriptive statistics as well as an account of the story of corporate raiding in Russia, before sections 3.4 and 3.5 move on to empirically analyse the determinants of raiding attacks in the country.

3.3 Context and Descriptive Analysis

Distribution of Raider Attacks over Time, Regions and Sectors

Although Integrum covers newspaper archives from 1991 onwards, I found the first clearly identifiable cases of corporate raiding for the year 1999. This confirms earlier accounts of raiding "arising at the turn of the century" (Kireev 2007, page 38), with the introduction of a new bankruptcy law in late 1998 "triggering" the start of raider attacks (Volkov 2004). While from 1999 to 2002 the number of attacks remains relatively low, attacks increase rapidly from 2003 onwards, to reach a peak in 2005 and 2006 (figure 3.2).

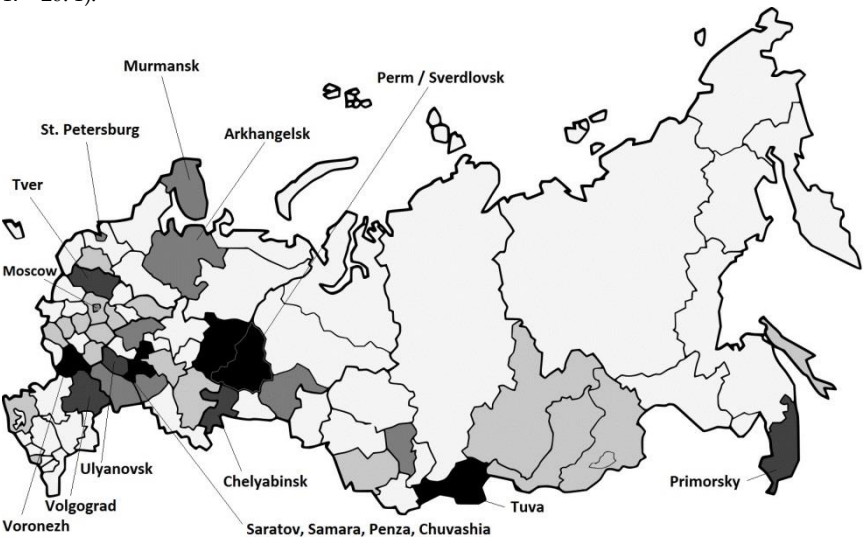
Figure 3.2: Number of Identified Raiding Attacks per Year



To show the regional distribution of raider attacks, I constructed an index showing the intensity of raidings across Russia's regions (raidings weighted by the average number of firms in a given region).

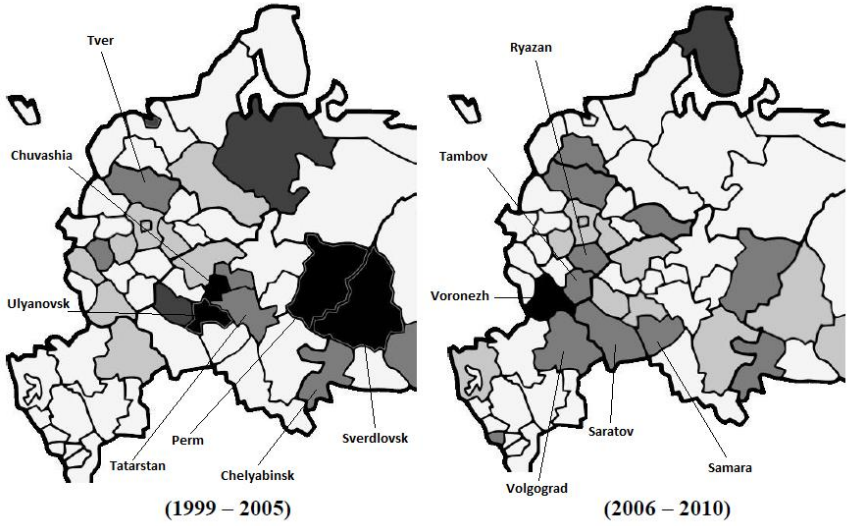
A graphic representation of this raiding intensity index reveals interesting regional patterns. Apart from a concentration in Moscow, St. Petersburg, Tver Oblast and Primorsky Krai in the Far East, raidings are centred in two groups of regions (figure 3.3). One group are the Ural Mountains, with the heavily industrialized regions of Perm, Sverdlovsk and Chelyabinsk showing a high prevalence of raiding cases. A second group are the Southern Russian regions of Samara, Penza, Saratov, Ulyanovsk, Voronezh and Volgograd, as well as the republic of Chuvashia.

Figure 3.3: Raiding intensity index (1999 - 2010) Raidings weighted by average number of firms in a given region, normalized from 1 (low intensity) to 20 (high intensity). White grey: 1 - 4, light grey: 5 - 8, darker grey: 9 - 12, dark grey: 13 - 16, black: 17 - 20. 1).



Disaggregating attacks over time reveals the dynamics of property conflicts in Putin's Russia (figure 3.4). In the early 2000s, corporate raiding attacks were concentrated in centres of heavy industry such as the Ural Mountains (Perm Krai, Sverdlovsk and Chelyabinsk Oblast), the Republic of Tatarstan or the region of Ulyanovsk, where large industrial conglomerates were trying to complete and consolidate their economic empires through hostile takeovers. Simultaneously, a number of ambitious latecomers such as the infamous raider Pavel Fedulov from Yekaterinburg were trying to belatedly build their own holding companies.

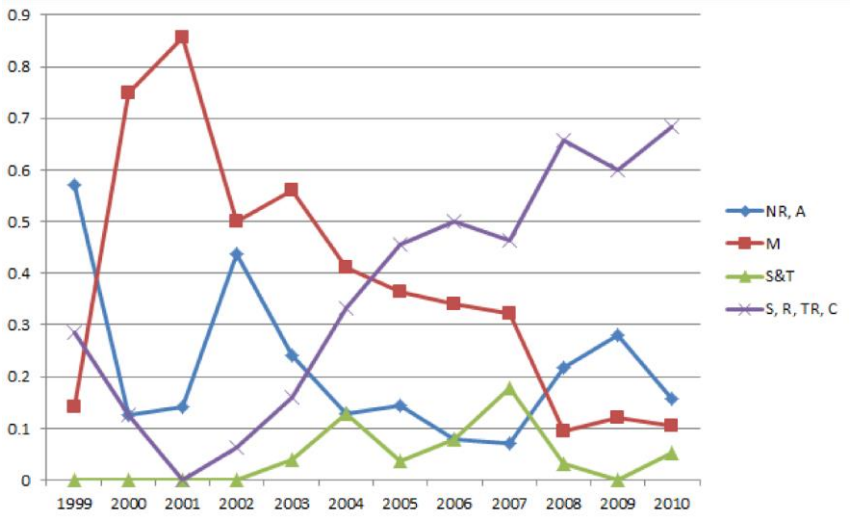
Figure 3.4: Raiding intensity index over time for Western Russia
Raidings weighted by average number of firms in a given region, normalized from 1 (low intensity) to 20 (high intensity). White grey: 1 - 4, light grey: 5 - 8, darker grey: 9 - 12, dark grey: 13 - 16, black: 17 - 20.



After 2005, the number of raiding attacks declines in the Urals and other heavily industrialized regions such as Ulyanovsk Oblast and Tatarstan, indicating a consolidation of property. At the same time, a shift in raiding cases towards a new centre of gravity around the Southern Russian regions of Ryazan, Tambov, Voronezh, Volgograd, Saratov and Samara becomes visible.

This shift in the regional distribution of attacks is also reflected in the sectoral distribution of raiding cases. While in the early 2000s, attacks are concentrated in the manufacturing sector, around 2005 a clear change is visible, with services, retail, transport and construction becoming the sectors mainly affected (figure 3.5).

Figure 3.5: Raider attacks by year and sector (as percentage of all attacks; NR: natural resources, A: Agriculture, M: manufacturing, S&T: science & technology, S: services, R: retail, TR: transport, C: construction).



The fact that raiders shift their attention from one sector to others over time shows the dynamics of property rights consolidation in an economy that is still in transition. In the early 2000s, the ownership situation of many manufacturing enterprises was still unstable. Many former Soviet company directors had acquired controlling stakes of their companies during the privatizations of the 1990s, and had thus become de-facto owners (the so called "red directors", see Barnes 2006). These directors were often unable to oppose well-organized raiding attacks, especially if raiders were acting on behalf and with the resources of larger conglomerates, or with the support of state agencies.

However, once a large number of factories had become part of bigger holding companies, these large holdings were better able to protect their assets, with the manufacturing sector consequently experiencing a certain consolidation in the second half of the 2000s. As it became more difficult for raiders to attack firms in the manufacturing sector, they shifted their focus to sectors that were easier targets, such as services, retail and construction.

Firm Characteristics

Taking a closer look at the characteristics of the firms in the present dataset helps to illustrate this point. In the early 2000s, the typical firms affected by raider attacks were large industrial enterprises with still high numbers of employees as a legacy from Soviet times, such as the steel works A.K. Serov in Yekaterinburg (attacked in 1999), the Kachkanarsk Mining Company (attacked in 2000), the Zapadno-Sibirskiy Metallurgicheskiy Kombinat in Novokuznetsk (attacked in 2000), or the Achinsk Alumina Refinery near Krasnoyarsk (attacked in 2002).

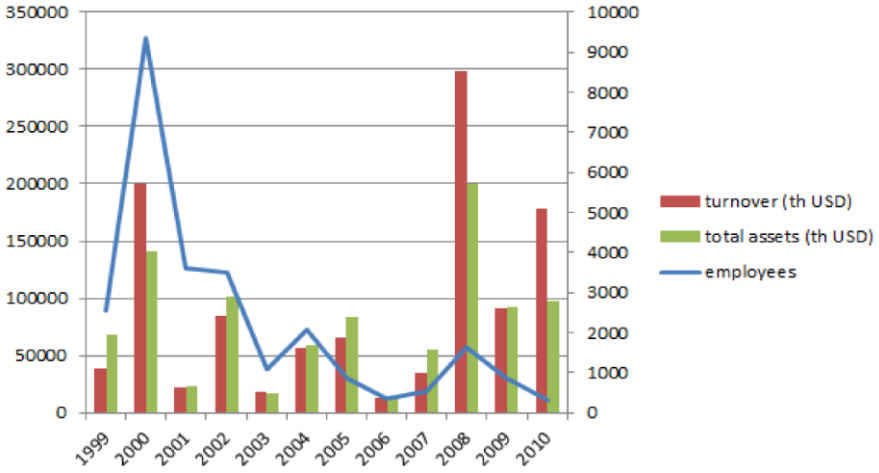
Eventually, as the manufacturing sector became more consolidated, raiders put their sights on a much larger spectrum of firms in different sectors and of different size. Typical examples of targeted firms in the second half of the 2000s range from restaurants, hotels and tourist

centres over car dealers, smaller supermarkets and specialized shops to agricultural companies, local housing service providers, transport companies or scientific research institutes. A number of large retail firms, such as the cosmetics chain *Arbat Prestige*, the mobile phone retailer *Evroset*, the supermarket chain *Lenta* or the electronic retailers *Svyaznoy* and *Eldorado* were also attacked during the late 2000s.

Table 3.6 illustrates this phenomenon. We see that from an average number of 3000 employees per attacked firm in the first half of the 2000s, the number falls to an average of around 750 employees from 2005 onwards. The high numbers for turnover and total assets between 2008 and 2010 are due to the attacks on big retail firms during this time.

Table 3.6: Average yearly turnover, total assets and number of employees of attacked firms

Left y-axis: th USD, right y-axis: employees; data from Orbis (Bureau van Dijk), available for 216 of the 312 firms in the dataset. Data for the large oil companies *Yukos* (attacked in 2003) and *Russneft* (attacked in 2007) has been excluded from the graph, as turnover (8.4 billion for *Yukos*, 4.6 billion for Russneft for the respective year of attack) and total assets figures (18.7 billion for *Yukos*, 6 billion for *Russneft*, respective year of attack) were much higher than for all other firms in the sample.



One common characteristic of the firms attacked during the second half of the decade is that most had been established during the late 1990s or the early 2000s. One can thus also identify a shift from old Soviet industrial property being targeted towards attacks against new and often innovative companies that have been founded during Russia's economic boom in the early 2000s.

This can be seen as a sign that the nature of raiding attacks in Russia has actually become more harmful over time. While some of the early raiding cases eventually led to industrial restructuring and the consolidation of holding companies (thus in the outcome resembling takeover cases in the West), the increasing number of attacks on young innovative firms since 2005 might constitute a growing threat to Russia's investment and incentive climate, as more and more the country's most dynamic companies are targeted. Although it is of course difficult to establish direct causality, the resulting negative incentive climate might be one of the reasons why entry of new firms has been consistently declining in Russia over the last 15 years (EBRD 2012, see also figure 1.3 in the introduction).

Raider Groups and the Involvement of State Agencies[29]

Who are the people that carry out a corporate raid? Volkov (2000, 2002) has described how the criminal groups that emerged during the late 1980s throughout Russia became increasingly well organized and established in the 1990s, up to the point that most businesses in Russia had to make regular payments to a protection racket or private security agency. Volkov called these criminal groups and private security agencies "violent entrepreneurs", as they used their ability to apply organized force to fill the vacuum left by the crumbling Soviet state. During these years, state agencies had lost the monopoly of violence,

[29] The analysis in this part is based both on secondary sources, and on a summary of the information I assembled through the study of the 1500 newspaper articles that I collected and read for this study.

and were often just another competitor on the market for protection money.

With the beginning of Russia's economic recovery after the financial crash in 1998, state agencies received better funding, re-consolidated and were eventually able to regain the monopoly of violence on the territory of the Russian state. Being pushed out of their initial market, many criminal groups legalized their structures and evolved into business groups or private security agencies. Others hired lawyers and began to work as consulting agencies for firms involved in corporate conflicts, using the connections and knowledge they had gained during the 1990s. Firms that were interested in taking over a rival approached these newly founded agencies, and soon the former violent entrepreneurs were carrying out corporate raids for a number of big business groups that wanted to consolidate their economic holdings (Bloom et al., 2003). According to Aldabergenova (2010), in 2004 no less than 100 such agencies were offering their services in Moscow alone, while Privalov and Volkov (2007) speak of "several dozen professional agencies throughout Russia".

A characteristic feature of these raiding groups are the close links they entertain with state agencies. During the early 1990s, the former Soviet security apparatus experienced a significant reduction of personnel. Many members of the security services that had lost their job went into the private sector, often joining private security agencies or other groups controlled by violent entrepreneurs. However, they kept close contact with colleagues that were still working for the state (Volkov 2000).

After the turn of the century, these former secret service members or policemen started using their connections to facilitate the corporate raids the agencies they worked for were conducting. As a result, raids were increasingly carried out with the active support of law enforcement agencies, tax officials, or the judiciary. Eventually, members of state agencies also started to directly play the role of a

raiding group in carrying out attacks for payment[30], in conducting raider attacks in the interest of higher placed regional and state officials, or in attacking companies for their own benefit (see e.g. Ledeneva 2013, pages 192-194).

In June 2010, then President Dmitry Medvedev denounced this state of affairs in an official meeting about corporate raiding with interior minister Rashid Nurgaliyev, deploring that "as a rule, these crimes are committed with the support of law enforcement officials"[31]. In the literature on corporate raiding, there is a strong consensus that it is almost impossible to carry out a successful raid without the help of state agencies.

Bloom et al. (2003) underline that "the main tool employed in the recent wave of hostile takeovers in Russia is the judicial branch of government, plus 'administrative resources'", while Volkov (2004) maintains that "the central feature of enterprise takeovers [is] the use of state courts, of special police forces, and of regional administrations to execute the change of management and ownership by means of physical or administrative coercion." Similarly, Privalov and Volkov (2007) argue that raiders usually operate with the help of elements in the judiciary, the security services or tax agencies, and that most raiding agencies are protected by some regional-level official in the FSB (Russia's federal security service).

For my sample, I checked for each raiding case if the illegal involvement of state agencies was mentioned. As it is likely that various state agencies (e.g. the police or the judiciary) are also associated with a raiding attack as part of their normal activities (e.g. in trying to help an attacked company, without being in any way acting

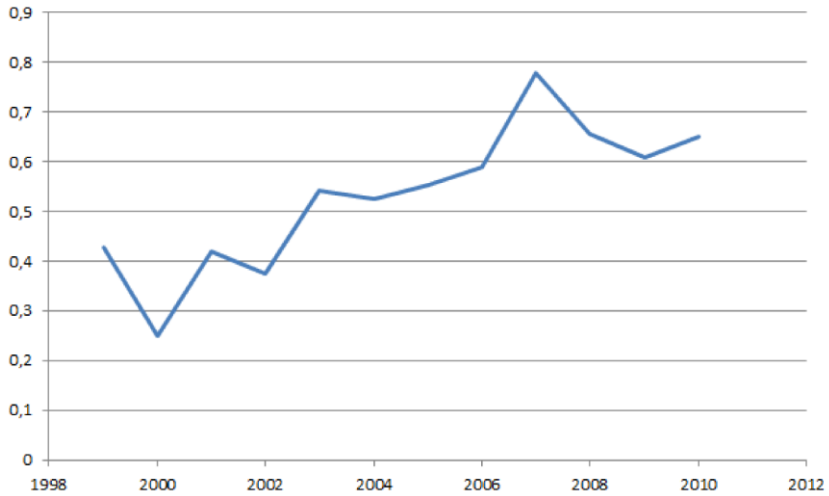
[30] A range of price lists are available on the internet, showing how much it would approximately cost to enlist a state agency for the provision of various raiding and enforcement services (see e.g. Aldabergenova 2010).

[31] Meeting between President Dmitry Medvedev and Minister of the Interior Rashid Nurgaliyev, Vnukovo Airport, 1.06.2010; "Law on improving the effectiveness of anti-raiding measures has been signed" (eng.news.kremlin.ru/news/532).

illegally), I took special care to check if the involvement of a state agency could indeed be characterized as illegal. Illegal state involvement is noted if at least two independent sources state that state agencies have acted against the law to support a raider attack, or have attacked a given company by themselves and acted in a predatory way (e.g. by supplying organized force, by arresting entrepreneurs on minor charges in order to facilitated an attack and make it more difficult for entrepreneurs to defend themselves, by refusing to investigate an attack when called upon, or by providing forged documents that then have been used in an attack). Various examples of illegal state involvement are provided below.

For 52.8% of cases, newspaper sources clearly stated that state agencies were supporting the group that carried out the raid, or were themselves initiators of an attack. Looking on state involvement over time, one can find a structural break occurring around the year 2003. While from 1999 to 2002, illegal state involvement was mentioned for 37% of cases, from 2003 to 2010, state agencies were involved in 61% of cases (figure 3.7).

Figure 3.7: Involvement of corrupt state agencies in illegal raider attacks (% of all attacks)



This increasing involvement of state structures in raiding cases and criminal persecution of businesses is also found by other studies. For example, Gans-Morse (2012) finds in a study based on 90 interviews and a survey carried out in 2009 and 2010 that threats to firms' property rights from the side of predatory state agencies have increased sharply after 2003, with firms also increasingly paying corrupt state officials to help solving corporate conflicts. In another recent paper, Yakovlev, Baranov and Nazrullaeva (2013) find an upward trend in predatory criminal persecution practices of entrepreneurs between 2004 and 2009. They however accord this fact mainly to the inefficient organization of the Russian police[32], although rent seeking behaviour and private interests of law enforcement officials also play a role.

To have a look at the nature of state involvement, I checked for each case what kind of state agency was involved. While the judiciary was involved in 21% of cases, the security services in 19% and tax agencies in 17%, the involvement of local and regional administrations was mentioned for 15% of cases, and some kind of regulatory agency was involved in 8% of cases.

In a typical case, the police or officials from a regulatory agency would confiscate corporate documentation during a regulatory control. These documents would then be used by corporate raiders in a takeover attack. An example is the attack on the meat processing factory *Plutos* in Moscow in 2004, where the owner was investigated by local police on charges that were soon dropped. However, the police asked him to provide a range of corporate documentation, which he submitted. Six months later, these documents were used in a successful takeover attack on *Plutos*. The company was resold six times in three months, with the premises and equipment finally being sold off and the company being dissolved, before the case could be heard in court.[33]

[32] With performance indicators that force policemen to file an increasing number of claims over time, the so called "stick system".

[33] Vedomosti, 21.09.2009; www.utro.ru, 01.12.2011

In other cases, the security services facilitated or provided logistical support for takeover attacks, or refused to intervene when called upon. In the well documented attack on the cosmetics chain *Arbat Prestige*, competitors allegedly paid police organs for help in attacking the company[34]. During an attack on *Alstom-SEMS* in 2001 (a company producing electrical machinery in Yekaterinburg), the police arrested the security service of the company in the middle of the night and drove them off in two minibuses to a forest 40 km outside of town. Two hours later, the company was taken over by 70 armed men[35]. When the chemical company *Uralchimmash* was attacked in Yekaterinburg in September 2000, the police helped the raider Pavel Fedulev to enforce his ownership claims, which were based on fraudulent documentation[36]. During the attack on a meat processing factory in Yekaterinburg in 2006 (*Yekaterinburgsky Mjasokombinat*), the police arrived but left again, calling the attack a "dispute amongst management entities"[37]. In Perm Oblast, the police, although called upon, allegedly cooperated with raiders by purposefully not investigating several cases of corporate theft[38].

The police also increasingly arrested entrepreneurs on minor charges, thus weakening their ability to defend themselves against attacks. While entrepreneurs were in prison, their companies were attacked by raiders, as happened for example in the case of the agricultural firm *Agromol* in 2008[39]. Volkov et al. (2010) show that in a large part of criminal cases related to economic crimes, these cases are not resulting from any wrongdoing by the arrested entrepreneurs, but are rather an outcome of services offered by law enforcement agents to raider groups and economic competitors.

---

[34] Kommersant, 25.01.2008; The Moscow Times, 11.10.2010

[35] NEWSru.com, 06.06.2001

[36] eanews.ru, 19.06.2006; urbc.ru, 13.06.2010

[37] Kommersant Ekaterinburg, 30.11.2006; uralpolit.ru, 08.12.2006

[38] Kommersant, 22.05.2009; http://ilya-shulkin.livejournal.com/779.html

[39] Kommersant, 21.11.2012; gazeta.ru, 26.05.2011

In a growing number of cases, security services themselves seemed to be among the initiators of attacks. Probably the most prominent example is the attack on the investment fund *Hermitage Capital Management*. *Hermitage* claims that the attack was initiated by a lieutenant-colonel in the Department of Tax Crime of the Interior Ministry, and approved of by the FSB. Allegedly, phoney tax claims were used to take over several companies, the accounts of which were then forged to claim large tax-repayments from the Russian state[40].

Privalov and Volkov (2007) argue that over time, a change in quality in the relation between security services and raider groups did happen. While at the beginning of the 2000s, raider groups paid corrupt state officials in return for logistical support, after a certain time members of the security services started to use raider groups as instruments to achieve their own objectives. Due to their initial cooperation with raiding agencies, the security services were well informed about illegal raids carried out by raider groups. They then used this information to blackmail and force raiders to carry out additional raids, with themselves becoming the main beneficiaries. In my sample of 1500 newspaper articles, I find evidence that confirms this hypothesis. While big industrial holdings are frequently mentioned as hiring raiding agencies to initiate attacks during the early years of the decade, from the mid-2000s onwards articles increasingly note that members of state agencies themselves ordered, initiated and benefited from attacks.

While the security services play a prominent role in raider attacks, especially because of their capability to use force, prosecutors, judges and the judicial system are equally involved. Often, raiders approach courts asking for legal decisions to obtain search warrants or official confirmation of ownership changes. These warrants are then used to occupy companies with the help of private security companies or local police forces. Although claims made by raiders are often based on fraudulent documentation, courts frequently grant the raiders' requests, either because they have been bribed, or because they did not understand the requests' fraudulent nature.

[40] New York Times, 24.07.2008; Vedomosti, 04.04.2008

For example, in the takeover battle over the Angarsk cement plant in 2007, raiders used search warrants to justify their forced occupation of the plant. The search warrants were issued by small local courts located far away from the city of Angarsk. Although the courts reversed their decisions in several cases after having realized that they had been victims of fraud, the search warrants had already served their purpose[41].

While the security services and the judiciary seem to be the state institutions most actively involved in raider attacks, the tax service also plays a significant role. An example is the attempt by the company *Syntech* to take over the world's largest ammonia producer *Togliatti Azot* in 2005. Shortly after *Syntech* acquired 10% of *Togliatti Azot* stock and tried to take control over the company's board of directors, *Togliatti Azot* was subject to sever pressure and a series of regulatory controls (120 in 18 months) by the tax authorities, in what allegedly amounted to a coordinated attack on *Togilatti Azot*[42]. The case of the Moscow book retailer *Biblio Globus* in 2007, where raiders obtained the company's constituent documents through the tax office and then used them in their attack[43], or the sudden and substantial tax claims that pushed the telecommunications company *Svyaznoy* on the brink of bankruptcy in 2008 are further examples[44].

By far the most famous involvement of tax agencies is the attack against the oil company *Yukos* that began in 2003. After the arrest of its owner Mikhail Khodorkovsky in late 2003, the company was presented with a series of tax claims that amounted to $27 billion, forcing the company to sell its core asset *Yuganskneftegaz* and eventually to declare bankruptcy in 2006. Shortly after *Yuganskneftegaz* was acquired by the then unknown shell company *Baikal-Finansgrup* in December 2004, *Baikal-Finansgrup* was bought by the state owned oil company *Rosneft*, thus confirming the political nature of the raid.

---

[41] Novaya Gazeta, 28.05.2007; compromat.ru, 04.09.2006

[42] Rossiskaya Gazeta, 07.06.2011; zhavat.ru, 06.09.2010

[43] Kommersant, 28.02.2008; litrossia.ru, 07.03.2008

[44] Vedomosti, 11.02.2008; Kommersant 11.02.2008

Due to its political implications, *Yukos* is not a typical raiding case but rather a personal reckoning between a leading businessman with political ambitions and president Putin, who in arresting Khodorkovsky eliminated a potentially dangerous political challenger (see e.g. Sakwa 2008). In the Yukos case, Russian courts have also repeatedly ruled that both the attack and Khodorkovsky's imprisonment are legal, thus making it difficult to strictly define the case as one of illegal state involvement.

However, although different in scope and nature than the other raider attacks in our sample, the *Yukos* affair still has important implications with regard to the involvement of state officials in corporate raiding. As shown above, the attack on *Yukos* in late 2003 coincides with a notable and lasting increase in the involvement of state agencies in raiding attacks (figure 3.7), as well as with a significant increase in the overall number of cases (figure 3.2). The number of entrepreneurs arrested on phoney charges also grew markedly after 2003, with Gans-Morse (2012, page 38) arguing that "after 2003, the initial year of the Khodorkovsky Affair, there was a notable increase in the number of economic crimes uncovered by Ministry of Internal Affairs investigators".

What are the determinants of increasing state predation?

Why do we find an increasing involvement of state agencies in raiding cases over time, especially for the period after the Yukos attack? Many observers see a link between Yukos and the increasingly predatory nature of Russian state agencies, with "every official after 2003 looking for his own little Yukos" (interview with the social activist Yana Yakovleva, cited by Gans-Morse 2012, page 36; see also Yakovlev 2012). In other words, it seems to be possible that once state officials at the very top started to steal openly, mid- and low-level state officials saw no reason to keep back either.

Two main hypotheses have been advanced to explain this increasingly predatory behaviour of Russian state agencies. According to the first

view, the central state has increasingly lost the ability to fully control local and regional state agencies. For example, Gans-Morse (2012) argues that these agencies have successfully opposed attempts by the centre to initiate reforms, which would have put into danger their ability to capture rents.

As a result, local law enforcement agencies are now widely active in the shadow economy, often cooperating with and playing the role of enforcement agents for criminal and raider groups (Kosals and Dubova 2012). The growing number of statements by Vladimir Putin and Dmitry Medvedev acknowledging the increase and emphasising the necessity to fight bureaucratic corruption could be seen as an argument in support of this hypothesis.

In addition, deficiencies within the institutional structure of Russia's security agencies also led to an increase in predatory criminal persecution practices, as members of the security forces face incentives that force them to ever increase the number of criminal charges filed (Yakovlev, Baranov and Nazrullaeva 2013).

While the first line of argumentation thus proposes an explanation linked to the way Russia's institutions are organized and reforms are implemented, the second one suggests a more direct link between the increase in economic crimes committed by Russian state officials, and the political system put into place and consolidated under Vladimir Putin.

Mendras (2012) argues that the very institutional changes introduced by Putin to consolidate his hold on power are at the origin of an increasing institutional decay in Russia. Especially from 2004 onwards, Putin has dismantled many of the institutions that have formerly assured at least a degree of accountability and democratic control, such as independent television channels or the election of provincial governors (centrally appointed from 2005 onwards). Due to the federal centre's selective interference in various law cases, the judiciary as an independent institution has also largely ceased to function (Mendras 2012, pages 175-181). The increase in predatory activities by state

agencies might thus be related to a concomitant decline of institutional quality, with the apparent strengthening of the federal centre and Putin's "vertical of power" making it actually more difficult for the centre to prevent local and regional state from acting in a predatory way, as various institutional control mechanism have been disabled.

An analysis complementing the one by Mendras is offered by Taylor (2011). He first shows how Putin has substantially strengthened the role of coercive agencies in the Russian state, and then argues that this has been accompanied by only a limited and one-sided increase in state capacity. While at the end of the 2000s the Russian state was significantly more able to repress oppositional movements than when Putin came to power, the ability of the security services to perform core law enforcement tasks such as fighting crime and terrorism has not improved, with the situation rather getting worse in some areas such as the security of property rights.

Taylor attributes this to the pathologies inherent in the way the power ministries work, such as the dominance of informal and personalistic decision-making, the lack of a monitoring and control structure, and the widespread persistence of Soviet-type belief structures characterized by conspiracy theories, a dislike of democratic political competition (often associated with 'disorder'), and the fear of Russia being threatened by external and internal enemies. While this specific mode of operation permitted the centre to use the security services to effectively suppress political opposition, the lack of transparency and accountability characteristic of this same mode of operation make it difficult for the security services to effectively fight abuse of power and illegal activities in their own ranks.

Consequently, even if the central state was willing to decisively tackle bureaucratic corruption and predatory behaviour by state agencies, this will only be possible after a broad reform of the security services and Russia's institutional system more generally. However, such a reform would in turn put into jeopardy the ability of the ruling elites to successfully control and suppress political opposition. As the capacity to do this is one of the pillars the current political system is built upon,

Putin and the ruling elites effectively face a trade-off between their secure hold on power, and an improvement of the rule of law that would permit them to tackle the problem of predatory state agencies.

The argument I advance in chapter 2 goes into a similar direction. I argue that the federal centre actually faces a trade-off between fostering economic growth and a favourable business climate in the regions, and assuring that regional elites deliver high vote shares for the Kremlin party and presidential candidate in Duma and presidential elections. Developing this hypothesis further, it might be conceivable that the elites in the centre are prepared to turn a blind eye on a certain level of predatory activities by regional elites, as long as these regional elites are able to deliver sufficiently high political and electoral support for the federal centre. In the next section, I will now try to test this hypothesis empirically.

3.4 Empirical model

This section is proposing an empirical test for a potential link between the increasing predatory behaviour of state agencies, and the mechanism assuring political control of the ruling elites in an electoral authoritarian regime, using data from the Russian Federation between 1999 and 2010.

Following the reasoning in the last section of part 3 above, the first hypothesis we are going to test is as follows:

> **Hypothesis 1:** The higher are the vote shares for the Kremlin candidate and party in presidential and Duma elections, as well as the degree of electoral manipulation in a given region, the higher will be the amount of predatory activities (measured by the number of raiding attacks per year) in a given region.

I will then also test to what extend the data in this study supports the argument made by Olson (1993) and Libman, Kozlov and Schultz (2012). Both studies argue that the weaker is the attachment of regional officials to a given region, the stronger is the likelihood that they will act in a predatory way (i.e. the likelihood that they can be characterized as roving rather than as stationary bandits). Accordingly, our second hypothesis to test will be the following:

> **Hypothesis 2:** The longer a regional governor has been serving in a given region, the better is his personal record in fostering regional economic growth, and the weaker are his ties to the federal centre, the lower will be the number of harmful predatory activities by local state officials (measured by the number of raiding attacks per year) in a given region.

To test both hypotheses, I will use a fixed-effects panel model, using data for 81 Russian regions for the time period 1999 to 2010. The following econometric specification will be used:

$$y_{it} = \beta_0 + \beta_1 election_{it} + \beta_2 irregular_i + \beta_3 tenure_{it} + \beta_4 central_{it}$$
$$+ \beta_5 growth_{it} + \beta_6 media_{it} + \beta_7 firms_{it} + \beta_8 X_{it}$$
$$+ \beta_9 year_i + \beta_{10} region_t + \epsilon_{it}$$

where y_{it} are the number of raiding attacks in a given region during a given year, *election* are the vote shares for either the Kremlin party United Russia in Duma elections or for the Kremlin candidate in presidential elections, *irregular* is the degree to which elections have been manipulated in a given region, *tenure* is the number of years a regional governor has been in office, *central* is a dummy equal to 1 if a governor had no previous links to a region prior to becoming governor, *growth* is regional GDP growth or regional GDP growth weighted by the time a governor was in office (see below for how this second indicator is constructed), *media* is an indicator for the degree of media freedom in a region, and *firms* stands for the number of firms in a region weighted by the population.

In addition, I also add a vector *X* of further regional control variables, such as proxies for the degree of organized crime, criminal activity and the level of human capital in a region, the age of a regional governor, an indicator of political instability, logged regional GDP per capita, the percentage of the population that is ethnically Russian, and a dummy being equal to one for the 10 biggest oil producing regions in Russia. Finally, *year* and *region* are time and regional dummies, and ϵ_{it} represents an idiosyncratic error term that is assumed to be uncorrelated with other explanatory variables.

Data on presidential and Duma election results in Russia's regions have been obtained from the Russian Central Election Commission (www.cikrf.ru). The variable describing election irregularities (irregular) comes from an article by Dmitry Oreshkin, published in Novaya Gazeta in November 2007 (Oreshkin 2007). For the time period 1995 to 2007, Oreshkin identifies and collects various statistics that might indicate possible election irregularities from the website of the Central Election Commission of the Russian Federation, such as an implausibly high or low participation rate in elections (1), an implausibly high number of invalid votes (2), a very high or low share of votes "against all"[45] (3), an implausibly high vote share for a single party or candidate (approaching 100% in some Russian regions) (4), and a high difference between results in a particular voting district and results in neighbouring districts (5). He then aggregates these various measures to build an index that is ranking Russia's regions according to the degree that election irregularities occurred.

Data on regional governors (*tenure*, *central* and *age*) have been gathered from official sources, such as the official websites of regional governors which normally provide extensive biographical information, as well as from other websites such as Wikipedia and various Russian websites that provide biographical data. For the variable *central*, I define that a previous link to a province exists if a governor was born, had lived or worked for a period longer than 6 months in a given region, prior to being elected or appointed governor of the region.

Data on regional economic growth, on regional crime levels (measured by the number of criminal cases filed by year and capita in a given region, as well as by the number of murders committed by year and capita), as well as on the quality of human capital (proxied by the number of university students per capita in a region) are from the Russian Federal Statistics Service Rosstat.

[45] Until 2006, Russian electoral ballots contained a box named "against all", allowing the voter to register a protest vote against all the candidates running.

Regional political instability is measured by a ranking published every year by the Russian rating agency Expert RA, with regions with higher political instability being given a higher ranking. Media freedom is a yearly indicator constructed by Nikolay Petrov at the Carnegie Centre in Moscow. Finally, the percentage of the population that is ethnically Russian (an indicator for the ethnic homogeneity of a given region) has been obtained from the website of Russia's national population census in 2010 (www.perepis-2010.ru).

To measure the personal economic performance of a regional governor, I use an indicator representing regional GDP growth weighted by the time a governor is in office. To construct the indicator, I follow Li and Zhou (2005, page 1755), who build a similar indicator to measure the economic performance of Chinese regional officials. The indicator is a moving average measure of the GDP growth rate over the time a governor is in office, $\tilde{g}_T$, which is defined as

$$\tilde{g}_T = \frac{1}{T}\sum_{t=1}^{T} g_t$$

where T is the number of years a governor is in office up to the point of calculation, t is the t-th year (t = 1, 2,..., T-1, T), and g_t is the GDP growth in the year t for a region. Thus, $\tilde{g}_T$ corresponds to an evaluation mechanism in which there is an annual assessment of a regional governor's economic performance, with the assessment for each year being based both on the past and on the current regional growth rate during the time a governor is office.

Table 3.1 presents summary statistics for all variables used in this study.

Table 3.1: Summary Statistics

Variable	Observations	Mean	St. Dev.	Min	Max
Presidential elections	972	0.637	0.124	0.250	0.998
Duma elections	972	0.400	0.181	0.014	0.987
Election irregularities	972	0.206	0.228	0	1
Log GRP per capita	972	11.222	0.959	8.537	14.152
Tenure	972	6.662	4.342	1	19
Central	972	0.081	0.273	0	1
GRP growth	972	0.054	0.065	-0.228	0.787
GRP growth (weighted)	972	0.042	0.043	-0.202	0.357
Media	972	2.753	0.859	1	5
Firms (per 1000 people)	972	24.448	13.293	7.882	115.11
Crime	972	0.021	0.007	0.0031	0.049
Murder	972	0.204	0.107	0.054	0.906
Human cap.	972	0.038	0.017	0	0.126
Political instability	972	45.676	25.234	1	88
Ethnic	972	0.776	0.246	0.0078	0.973

3.5 Regression Results

Table 3.2 presents the results of the regression analysis. We see that the vote share for the Kremlin candidate in presidential elections, as well as the vote share for the Kremlin party United Russia in Duma elections are indeed significantly and positively correlated with the number of raider attacks in a given region. The coefficient for the degree to which elections are manipulated throughout Russia's regions is also significant and positive. The regression results thus corroborate hypothesis 1 (page 74).

From Frye, Reuter and Szakonyi (2012), we know that regional governors are under pressure to deliver electoral support for the centre during Duma and presidential elections. Frye et al. also show that governors extensively use their respective administrations (or "political machines") to manipulate elections and deliver expected results. Moreover, in chapter 2 we have seen that delivering election results is one of the main criteria influencing the probability of regional governors being reappointed (at least for the time period after 2006), while the economic performance of a given region plays no or even a negative role in this respect.

In other words, the central elites in Russia seem to accord a high importance to a good electoral performance of the Kremlin candidate and party in national elections, while regional economic development seems to be relatively less important. While we do not have any evidence that the Kremlin is directly trading access to economic assets against the delivery of electoral support, it is quite conceivable that at least a certain degree of predatory activities in a given region are tolerated by the centre, as long as regional administrations are able to deliver sufficiently high levels of political support.

This would also explain why the central state has been consistently hesitant to intervene or condemn predatory activities by regional state

Table 3.2: Regression Results

	OLS; dependent variable: raiding attacks per year and region; robust standard errors; *** 1% significance level, ** 5% significance level, * 10% significance level; significant results marked bold.			
	1)	2)	3)	4)
Pres. elections	**1.398****		**1.299***	
	(0.696)		**(0.682)**	
Duma elections		**0.881***		**0.879***
		(0.532)		**(0.531)**
Election irregularities	**1.327***	**1.914*****	**1.401***	**1.718*****
	(0.797)	**(0.688)**	**(0.799)**	**(0.664)**
Tenure	**-0.024***	**-0.22***	**-0.025****	**-0.024***
	(0.013)	**(0.013)**	**(0.013)**	**(0.013)**
Central	0.045	0.043	0.045	0.045
	(0.106)	(0.108)	(0.107)	(0.109)
Weighted GDP growth	**-1.933****	**-1.78****		
	(0.796)	**(0.755)**		
Annual GDP growth			-0.147	-0.106
			(0.452)	(0.447)
Media freedom	**0.205****	**0.212****	**0.196****	**0.203****
	(0.098)	**(0.099)**	**(0.097)**	**(0.098)**
Firms (per 1000 people)	**0.045****	**0.044***	**0.044***	**0.044***
	(0.023)	**(0.023)**	**(0.023)**	**(0.023)**
Crime	**0.0002***	**0.0002***	**0.0003***	**0.0002***
	(0.0001)	**(0.0001)**	**(0.0001)**	**(0.0001)**
Murder	0.647	0.347	0.535	0.246
	(0.618)	(0.688)	(0.688)	(0.697)
Governor's age	0.007	0.006	0.008	0.007
	(0.005)	(0.005)	(0.005)	(0.005)
Human capital	19.352	18.444	18.722	17.958
	(14.832)	(14.915)	(14.994)	(15.066)
Log GDP per capita	**0.643***	**0.629***	0.504	0.493
	(0.374)	**(0.358)**	(0.356)	(0.339)
Political instability	**0.007****	**0.006****	**0.007****	**0.006****
	(0.003)	**(0.003)**	**(0.003)**	**(0.003)**
Ethnic	0.323	0.891	0.522	0.678
	(0.656)	(0.544)	(0.658)	(0.518)
Oil	-0.537	-0.209	-0.35	-0.178
	(0.509)	(0.312)	(0.486)	(0.308)
Time / Reg. FE	yes	yes	yes	yes
R-squared	0.4502	0.4503	0.4488	0.4491
Observations	972	972	972	972

officials. For example, in the cases of Hermitage Capital or Yevgeny Chichvarkin and the mobile retailer Evroset, the central state eventually turned against the victims of raider attacks to the extent that they had to leave the country, as they had collected too much incriminating evidence against regional state agencies[46].

Furthermore, we have also seen in section 3.3 that regional administrations, security, tax and regulatory services as well as the regional judiciary have increasingly been involved in predatory raiding attacks over the last decade. While again I have no direct evidence to show that those members of regional administrations that manipulate elections and those that are involved in predatory activities are the same or that they are somehow linked, this is a possibility. Presumably, regional administrations that regularly act illegally in manipulating elections might also have fewer inhibitions to participate in rent-seeking and other predatory activities.

However, the interpretation presented above is of course not the only possible one. Table 3.2 also shows that the coefficients for the number of criminal cases per capita in a given region is positive and significant, while the number of murders per capita has also a positive sign, although it is not significant. An alternative explanation of our regression results might thus be that in regions that are more heavily affected by criminal activities and organized crime (resulting in a higher number of raider cases), people vote for Vladimir Putin and his party, in the hope for protection.

However, although such an alternative explanation might seem reasonable at first glance, it is difficult to find evidence in the literature in support of such an interpretation. At least since early 2011, the Kremlin party United Russia has been widely called "the party of

[46] Both Hermitage Capital owner Bill Browder and Evroset founder Yevgeny Chichvarkin invested significant amounts of resources to investigate the attacks mounted against them, eventually revealing the names and affiliations of the regional officials that had attacked their firms. As a result, one of the lawyers hired by Hermitage Capital in the investigation was arrested and died in prison, while both Hermitage Capital and Chichvarkin had to leave Russia.

crooks and thieves"[47] throughout Russia, making it seem unlikely that people would want to appeal to such a party for protection against predatory state agencies.

If we now look on the coefficient for the variable measuring the length a regional governor has stayed in office (tenure), we see that it is significant and negative across all specifications. In other words, the longer a given governor has been serving in a region, the lower is the number of predatory raiding attacks that took place in his region.

We also see that the dummy variable indicating that a governor has had no prior ties to a region before becoming governor is consistently positive, even though it is not significant. Finally, if we look on the *personal* economic performance of a governor in a given region (weighted GDP growth), we see that it is significantly and negatively correlated with the number of raiding cases. In other words, it seems that the better a regional governor is able to manage his region economically, the lower is the number of predatory activities by regional state officials.

In this study, I thus find additional evidence confirming the results obtained by Libman, Kozlov and Schultz (2012), as well as evidence illustrating the argument made by Olson (1993) about roving and stationary bandits. The longer a governor has been serving in a given region, the stronger are his ties to the region, and the more he cares about the economic development of a region, the lower is the number of predatory activities by regional officials. In other words, the closer a governor fits the characterization of a *stationary bandit* developed by Olson (1993), the stronger indeed seem to be his interests to engage in the long-term development of a region (or at least in long-term rent-seeking relationships with regional businesses), instead of focusing on short-term asset grabbing.

[47] Coined by the blogger Alexey Navalny in early 2011, the nickname "party of crooks and thieves" for United Russia has since then been widely used throughout the country; see e.g. Time, 29.12.2011, *"Russia Rising: The Blogger who is Putin's Greatest Challenger"*.

Judging from these results, it would thus be in the interest of the federal centre to promote regional economic stability by keeping governors in place for longer time periods, if the primary objective of the centre would be regional economic development. But from the results presented in chapter 2, we see this is not the case. From the time the Kremlin has been appointing its own candidates (i.e. from 2007 onwards), we see that longer serving governors were systematically replaced by new governors that often had no prior ties to a given region (with length of tenure having a significant and negative effect on the probability of a regional governor to remain in office from 2007 onwards, see regression results on page 44).

Finally, we will have a short look on the regression results for media freedom and various economic controls. We see that the degree of media freedom is significantly and positively correlated with the number of raiding cases in a region. As the source through which information has been obtained in this study are newspaper articles, this result makes sense. The freer is the press in a given region, the higher is the likelihood that it will report cases of predatory corporate raiding.

Firm density in a given region (i.e. the number of firms weighted by the population) as well as gross regional product per head are also significantly and positively correlated with the number of raiding attacks. It thus seems that in regions where there is more to steal, criminal raiding groups and corrupt state agencies are also more actively involved in illegal asset grabbing.

3.6 Conclusion

In this chapter, I present a new dataset on illegal corporate raiding activities that took place in Russia between 1999 and 2010. Carrying out a comprehensive scan of Russian national and regional newspaper archives and using a strict definition of illegal corporate raiding, I found evidence for 312 raiding cases that took place between 1999 and 2010.

I am able to identify a shift both in the regional and sectoral distribution of raiding cases over time. I also find that regional state agencies have become increasingly involved as supporters or initiators of illegal asset grabbing and illegal raider attacks, especially after the year 2003. This finding is in line with results that have been found elsewhere in the literature. I conjecture that the increase in illegal predatory activities by state agencies after 2003 might be linked to the attack on the oil company *Yukos* that took place in the same year, with regional state agencies after 2003 feeling less constrained to act in a predatory way, after having observed how the federal centre expropriated one of Russia's leading businessmen.

I then carry out a panel regression analysis, to look at the deeper determinants of corporate raiding in Russia's regions. I find that vote shares for the Kremlin candidate in presidential elections, as well as vote shares for the Kremlin party United Russia in Duma elections and the degree to which elections have been manipulated in Russia's regions are all positively and significantly correlated with the number of raiding attacks in a given region. I hypothesise that this might be evidence for a sort of quid-pro-quo mechanism, with the central state tolerating a certain degree of predatory activities by regional elites, as long as these same elites are able to deliver a sufficiently high level of electoral support for the ruling elites in the centre.

I then also find evidence that the stronger are the ties of a governor to a given region, the lower is the number of raider attacks in the region. I

argue that these findings confirm empirical evidence found by Libman, Kozlov and Schultz (2012), who show that Russian governors with weak ties to a given region are more likely to act in a predatory way. My results also illustrate the argument made by Olson (1993) on stationary and roving bandits, by showing that regions with Russian governors who could be characterized as stationary bandits are less affected by raiding attacks than regions with governors whose lesser attachment to a region makes them look like roving bandits.

This chapter thus confirms and extends the findings presented in chapter 2. Both studies find evidence that in the Russian Federation under Vladimir Putin, the central elites face a trade-off between ensuring their political control over the country, and promoting regional economic growth. While I argue in chapter 2 that regional governors are appointed for their ability to foster election results, rather than for their ability to successfully manage a regional economy, chapter 3 presents evidence that the federal centre might even permit regional elites to engage in a certain degree of stealing and asset grabbing, as long as these same elites are able to deliver sufficient political support to the centre.

3.7 References

[1] Aldabergenova B. (2010), Reiderstvo - Sestra Korruptsii ili Chleb Bednich Chinovnikov? [Raiding - Sister of Corruption or Daily Bread of Poor State Officials?], *Evrasiskii Iuridicheskii Zhurnal*, 1(20)

[2] Barnes A. (2006), Owning Russia: The Struggle over Factories, Farms, and Power, *Cornell University Press*, Ithaca and London

[3] Bloom D., Ratnikov K., Osipov K., Areshev S. (2003), Corporate Takeovers, Russian Style: How to Defend Against Them, *Coundert Brothers LLP*, Moscow

[4] Carbonell et al. (2009), Hostile Takeovers: Russian Style, *First-Hand Perspectives on the World Economy*, Wharton School, University of Pennsylvania

[5] Demidova E. (2007), Hostile Takeovers and Defenses against them in Russia, *Problems of Economic Transition*, 50(5), 44-60

[6] Demnin V., Labutin A. (2011), Reiderstvo - Seriosnaja Ugrosa Ekonomitsheskoi Besapasnosti Rossii [Raiding - A Serious Threat to the Economic Security of Russia], *Vestnik St. Peterburgskovo Universitjeta MVD Rossii*, 50(2), 139-147

[7] Dzarasov R. (2011), Eichnerian Megacorp and Investment Behaviour of Russian Corporations, *Cambridge Journal of Economics*, 35(1), 199-217

[8] EBRD (2012), Diversifying Russia: Harnessing Regional Diversity, *European Bank for Reconstruction and Development*, London

[9] Egorov G., Sonin K. (2011), Dictators and their Vizirs: Endogenizing the Loyalty-Competence Trade-Off, *Journal of the European Economic Association*, 9(5), 903-930

[10] Filimonova V. (2008), Reiderstvo kak Sotsialno-Ekonomicheskii i Politicheskii Phenomen Sovremenoi Rossii [Raiding as a Socio-

Economic and Political Phenomenon of Contemporary Russia], *Obshchestvo i Ekonomika*, 5, 101-139

[11] Firestone T. (2008), Criminal Corporate Raiding in Russia, *International Lawyer*, 42(4)

[12] Firestone T. (2010), Armed Injustice: Abuse of the Law and Complex Crime in Post-Soviet Russia, *Denver Journal of International Law and Policy*, 38(4)

[13] Frye T., Reuter O., Szakonyi (2012), Political Machines at Work: Voter Mobilization and Electoral Subversion in the Workplace, *working paper BRP 08/PS/2012*, Higher School of Economics, Moscow

[14] Frye T., Shleifer A. (1997), The Invisible Hand and the Grabbing Hand, *American Economic Review*, 87(2), 354-358

[15] Gandhi J., Lust-Okar E. (2009), Elections under Authoritarianism, *Annual Review of Political Science*, 12, 403-422

[16] Gans-Morse J. (2012), Threats to Property Rights in Russia: From Private Coercion to State Aggression, *Post-Soviet Affairs*, 28(3), 263-295

[17] Kapeliushnikov R., Kuznetsov A., Demina N., Kuznetsova O. (2012), Threats to Security of Property Rights in a Transition Country: An Empirical Perspective, *Journal of Comparative Economics*, 41(1), 245-264

[18] Kireev A. (2007), Raiding and the Market for Corporate Control: The Evaluation of Strong-Arm Entrepreneurship, *Problems of Economic Transition*, 50(8), 29-45

[19] Kosals L., Dubova A. (2012), Commercialization of Police and Shadow Economy: The Russian Case, *Economic Sociology: The European Newsletter*, 13(2), 21-28

[20] Kryshtanovskaya O., White S. (2003), Putin's Militocracy, *Post-Soviet Affairs*, 19(4), 289-306

[21] Kryshtanovskaya O., White S. (2009), The Sovietization of Russian Politics, *Post-Soviet Affairs*, 25(4), 283-309

[22] Ledeneva A. (2013), Can Russia Modernize? Sistema, Power Networks and Informal Governance, *Cambridge University Press*, Cambridge

[23] Li H., Zhou L. (2005), Political Turnover and Economic Performance: The Incentive Role of Personnel Control in China, *Journal of Public Economics*, 89, 1743-1762

[24] Libman A., Kozlov V., Schultz A. (2012), Roving Bandits in Action: Outside Option and Governmental Predation in Autocracies, *Kyklos*, 65(4), 526-562

[25] Markus S. (2012), Secure Property as a Bottom-Up Process: Firms, Stakeholders, and Predators in Weak States, *World Politics*, 64(2), 242-277

[26] Mendras M. (2012), Russian Politics: The Paradox of a Weak State, *Hurst & Company*, London

[27] Olson M. (1993), Dictatorship, Democracy, and Development, *American Political Science Review*, 87(3), 567-576

[28] Oreshkin D. (2007), Vybory i Geographiya Administrativogo Resursa [Elections and the Geography of 'Administrative Resources'], *Geography Institute of the Russian Academy of Sciences*; an abridged version of the study was published in Novaya Gazeta, November 11th 2007

[29] Osipian A. (2011), Corporate Raiding Russian Style: Hostile Takeovers via Corruption and Fraud, working paper, Vanderbilt University

[30] Osipian A. (2012), Predatory Raiding in Russia: Institutions and Property Rights After the Crisis, *Journal of Economic Issues*, 46(2), 1-11

[31] Privalov A., Volkov A. (2007), Rashushdenjie o Reiderstve po Metode Barona Kyuve [Thinking about Raiding by Following the Method of Baron Cuvier], *Expert*, May 14th 2007, 18(559)

[32] Radygin A. (2010), The Russian Mergers and Acquisitions Market: Stages, Features, and Prospects, *Problems of Economic Transition*, 52(10), 65-95

[33] Reisinger W., Moraski B. (2011), Skill or Loyalty? The Fate of Russia's Governors Under Presidential Control, *mimeo*

[34] Sakwa R. (2008), The Quality of Freedom: Khodorkovsky, Putin, and the Yukos Affair, *Oxford University Press*, Oxford

[35] Sakwa R. (2011), Raiding in Russia, Russian Analytical Digest, 105, 9-13

[36] Sergeeva O. (2009), Corporate Takeover in Russia, MA Thesis, *Central European University*, Budapest

[37] Settles A. (2009), Evolving Corruption: Hostile Takeovers, Corporate Raiding, and Company Capture in Russia, *Center for International Private Enterprise*, Washington

[38] Taylor B. (2011), State Building in Putin's Russia: Policing and Coercion after Communism, *Cambridge University Press*, New York

[39] Volkov V. (2000), Between Economy and the State: Private Security and Rule Enforcement in Russia, *Politics & Society*, 28(4), 483-501

[40] Volkov V. (2002), Violent Entrepreneurs: The Use of Force in the Making of Russian Capitalism, *Cornell University Press*, Ithaca and London

[41] Volkov V. (2004), Hostile Enterprise Takeovers: Russia's Economy in 1998-2002, *Review of Central and East European Law*, 29(4), 527-548

[42] Volkov V., Paneyakh E., Titaev K. (2010), Proizvolnaya Aktivnost Pravookhranitelnykh Organov v Sfere Borby s Ekonomicheskoi Prestupnostyu [Arbitrary Activity of Law Enforcement Agencies in the Sphere of the Struggle with Economic Crime], analytical paper, *Institute for the Rule of Law*, St. Petersburg

[43] Woodruff D. (2004), Property Rights in Context: Privatization's Legacy for Corporate Legality in Poland and Russia, *Studies in Comparative International Development*, 38(4), 82-108

[44] Yakovlev A. (2012), Otnjat ili Sosdat? Stimuli k Primeneniu Nasilia v Ekonomike I Faktori, Spasobnie evo Ogranitshit? [To Steal or to Create? Incentives to Use Force in an Economy, and Factors that Permit to Limit This], in: Verhovenstvo Pravo kak Opredeliaushi Faktor Ekonomiki [The Rule of Law as Determining Factor of an Economy], Center for Legal and Economic Studies, Higher School of Economics, Moscow (forthcoming)

[45] Yakovlev A., Baranov A., Nazrullaeva E. (2013), Criminal Persecution of Business in Russia's Regions: Private Interests vs. "Stick" System, *working paper*, Higher School of Economics, Moscow

[46] Zhang X. (2010), Scramble for Control: Market, Law, and Corporate Property Conflicts in Russia, PhD thesis, *University of California*, Los Angeles

[47] Zhuravskaya E. (2008), Is There the Rule of Law in Russia? The Case of Corporate Raiding - A Note, *Economics Working Paper Series No. 94*, Center for the Study of Economic and Social Change in Europe, UCL SSEES, London

3.8 Appendix

Table 3.3: Importance and Frequency of Raiding Attacks in Russia (Estimates by Experts and Leading Politicians) We see that estimates vary considerably, but are generally much higher than the number of 312 cases I found by analysing Russian newspaper archives. I.e., either the biggest part of cases never makes it into the press, or estimates by experts are somehow inflated.

Estimate	Expert / Politician / Institution	Source / cited by
"...more than 60 000 attacks per year."	Sergey Mironov (former head of the party "A Just Russia")	Demnin, Labutin (2011, page 140)
"...in 2004, more than 100 groups active in Moscow alone."	A. Kireev (Moscow city government)	Aldabergenova (2010)
"...about 5000 cases between 2000 and 2004, 1900 cases in 2005 alone."	Russian Chamber of Commerce and Industry	Demnin, Labutin (2011, page 140)
"...by 2001, thousands of cases per year."	Volkov (2004)	Volkov (2004, page 527)
"...in Moscow, 11 cases in 2003, and in 2006 already 53, i.e. a 5 times increase in 4 years."	Moscow city prosecutor Yurii Semin	Volkov, Privalov (2007)
"...from 2002 to 2005, about 5000 companies attacked."	Victor Pleskachevskii, head of the state committee for property	Volkov, Privalov (2007)
"...every year, about 60.000 to 70.000 attacks in Russia."	Elena Ballask, St Petersburg Law Institute of the General Prosecutor	Volkov, Privalov (2007)
"...approximately 70.000 Russian companies a year become targets of	Carbonnell et al. (2009)	Carbonnell et al. (2009, page 1)

raider attacks."		
"In 2005 Russia's Ministry of Internal Affairs had under preliminary investigation 346 criminal cases connected with the unlawful seizure of firms - twice as many as in 2004."	Demidova (2007)	Demidova (2007, page 47)
"300 Moscow businesses are raided every year."	Ivan Novitskii, deputy of Moscow city Duma (2007)	Firestone (2008, page 1207)
"Every year, 60.000 to 70.000 companies attacked in Russia."	Auditing Chamber of the Russian Federation	Osipian (2011, page 8)
"Every year, 70.000 to 80.000 attempted raider attacks result in about 5000 successful hostile takeovers."	Filimonova (2008)	Filimonova (2008, page 40)

Chapter 4

Absorptive Capacity Compared: Evidence from Sectoral Data

4.1. Introduction[48]

Despite the emergence of newly industrialized economies and an increasing fragmentation of global production, most innovations are still carried out in a small number of R&D intensive countries (Eaton and Kortum 2001, Caselli and Wilson 2004). The large majority of developing and newly industrialized countries import technology from these countries (Mastromarco 2008).

Gerschenkron (1962) and Abramovitz (1986) have argued that developing countries have a higher growth potential than advanced countries, as they can realize relatively larger productivity gains in adopting advanced technologies. In a theoretical paper, Acemoglu et al (2006) formalized the idea that developing countries should focus on adopting foreign technology before starting to innovate themselves. According to the case study literature, this is indeed what happened in newly industrialized countries such as South Korea, Taiwan or more recently China (Amsden 1989, Wade 1990, Breznitz and Murphree 2011). In all these economies, the capacity to successfully absorb foreign technology has played a crucial role in sustaining high growth rates.

Understanding differences in absorptive capacity is thus key to understand the large differences in productivity and income across countries (Prescott 1998). While the technological distance from R&D intensive countries determines the *scale* of potential benefits from

[48] This chapter is a joint work with Letizia Montinari, University of Trento.

importing technology, and trade liberalization opens up *channels* of technology transfer, the ability of a country to absorb imported technology is crucial to *realize* the potential gains from catching-up and trade.

The aim of this paper is to examine levels and determinants of absorptive capacity for two groups of industrialized and emerging economies in Asia and Latin America, and a group of European OECD countries that also includes the US. While this last group is composed of countries that have been leading industrialized nations for a long time, the Asian and Latin American countries in our sample, with the exception of Japan, are mostly developing and newly industrialized economies. Comparing these three country groups permits us to investigate if levels and determinants of absorptive capacity systematically differ across regions that are at different levels of economic development, and share different political and historical contexts.

How to measure absorptive capacity? In our paper, we take technical efficiency of each manufacturing industry in a given country as a proxy for absorptive capacity. Technical efficiency is both measurable and a close approximation of the concept of absorptive capacity we have in mind. To estimate levels and determinants of technical efficiency we use stochastic frontier analysis (SFA) and sectoral data, which permits us to treat technical efficiency and technical change as two distinct components of total factor productivity (TFP) in each industry.

Instead of using SFA, most previous studies in the absorptive capacity literature have employed a two-stage modelling strategy (Senhadji 2000, Miller and Upadhyay 2000, Madsen et al. 2010), which however suffers from a number of flaws (that we discuss in section 2). The few studies using SFA have either focused on OECD countries (Griffith et al. 2003, 2004, Kneller and Stevens 2006), or have used aggregate data (Mastromarco 2008, Henry et al. 2009), and do not have data for recent years. Using sectoral instead of aggregate data permits us to get more precise results, and to distinguish between effects on low-tech and high-tech sectors. As sectoral data has become available only recently

for many developing countries, this paper is the first one, to our knowledge, that combines SFA with the use of sectoral data for both developed and developing countries.

We investigate the effect of two potential determinants of absorptive capacity, namely human capital measured by years of schooling, and the effectiveness of domestic R&D, proxied by the stock of patents filed by a country. While most previous studies have either examined the effects of human capital (Nelson and Phelps 1966, Cohen and Levinthal 1989, Benhabib and Spiegel 1994, 2005) or R&D expenditure (Verspagen 1991, Fagerberg 1994, Aghion and Howitt 2005) on absorptive capacity, we follow more recent studies that look on both determinants (Kneller and Stevens 2006). However, instead of R&D expenditure we use stock of patents as a proxy for R&D, which to our knowledge has not been done before in this context.

The contributions of this paper to the literature are thus twofold. To our knowledge, this paper is the first using SFA and sectoral data to comparatively analyse efficiency levels and determinants of absorptive capacity across three groups of developed and developing countries. Secondly, instead of R&D expenditure, we introduce the use of stock of patents as a proxy for R&D to the absorptive capacity literature.

We find that levels of technical efficiency slightly increase over the time span covered in our study, with the exception of Latin America, where efficiency in high-tech sectors experiences a sharp drop after 1999. A temporary drop in high-tech efficiency, albeit less pronounced, is also noticeable for Asia and OECD countries after 1999. While in Europe low-tech sectors are on average more efficient than high-tech sectors, the opposite is the case for Asia and the US, with Latin America showing mixed results. Looking on the determinants of technical efficiency, we find that human capital has always a strongly positive effect on efficiency, especially in low-tech sectors. An increase in the stock of patents has positive effects on efficiency in high-tech sectors, but negative effects in low-tech sectors, especially for Asia and Latin America.

In the following, section 4.2 will discuss our empirical strategy, and section 4.3 presents the data. Section 4.4 shows the results for our frontier estimation, for the efficiency levels and for determinants of technical efficiency, and section 5 concludes.

4.2 Empirical Strategy

We use SFA, as it provides an ideal framework to estimate technical inefficiency. SFA is preferred to the more popular two-stage modelling approach used in most of the previous literature, since it is statistically more accurate and matches more closely the idea of absorptive capacity we want to capture.

The two-stage approach consists in estimating TFP as residual of a parametrized production function, and then regressing it against a number of factors which are considered to be linked to changes in productivity (Senhadji 2000, Miller and Upadhyay 2000, Madden et al. 2001, Okabe 2002, Wang 2007, Madsen et al. 2010). However, Koop et al. (1999) and Koop et al. (2000) point out that while in the first stage of this approach the efficiency terms are assumed to be identically and independently distributed, in the second stage they are a function of a number of variables which might directly enter the production function specification (or be correlated with explanatory variables), thereby contradicting the assumption of identically distributed inefficiency terms (Battese and Coelli (1995), pp. 326). SFA overcomes this problem by assuming that technical inefficiency effects of production are independently but not identically distributed, and then by simultaneously estimating the stochastic frontier and the inefficiency model.

Another important feature of SFA is that it allows us to distinguish between technical progress, technical efficiency, and a stochastic component of TFP. This distinction is omitted in the two-stage approach, where TFP is used as a measure of technical inefficiency. A

third criticism concerns the use of the country with the highest TFP as the numeraire in a measure of relative productivity, to account for the distance to the technical frontier (Griffith et al. 2004, Kneller 2005). This approach is based on two unrealistic assumptions. First, it assumes that the country with the highest TFP is at the frontier, which might not be true. Secondly, it assumes that a unique technology frontier exists for all countries. In the SFA approach, the concept of absorptive capacity is instead related to that of production frontier, which represents the maximum output that can be produced starting from any given input vector (i.e. the upper boundary of the production possibilities set).

Our empirical strategy is based on that of Battese and Coelli (1995). Following their formulation, the stochastic production frontier can be expressed as

$$Y_{ijt} = \exp\left(x_{ijt}\beta + V_{ijt} - U_{ijt}\right) \quad (1)$$

where Y_{ijt} is output, x_{ijt} is a vector of inputs of production, β is a vector of parameters to be estimated, V_{ijt} are random errors which capture the stochastic nature of the frontier, and U_{ijt} are non-negative random variables which denote technical inefficiency of production and are obtained by a truncation at zero of the normal distribution with mean $z_{it}\delta$ and variance σ^2 (see Battese and Coelli 1995).

The technical inefficiency effect is specified by the following equation

$$U_{ijt} = z_{it}\delta + W_{ijt} \quad (2)$$

where z_{it} is a vector of explanatory variables associated with technical inefficiency of production, δ is a vector of unknown coefficients, and W_{ijt} is a random variable defined by the truncation of a normal distribution with zero mean and variance σ^2. The requirement that $U_{ijt} \geq 0$ is ensured by truncating W_{ijt} such that $W_{ijt} \geq -z_{ijt}\delta$.

To estimate equation (2), we assume a semi-translog specification (i.e. translog in k and l, as proposed by Kneller and Stevens 2003), which provides a less restrictive functional form for a production function

$$y_{ijt} = \beta_{0j} + \beta_1 k_{ijt} + \beta_2 l_{ijt} + \beta_3 k_{ijt}^2 + \beta_4 l_{ijt}^2 + \beta_5 k_{ijt} l_{ijt} + \beta_6 p_{it} + \beta_7 r_{it} + \beta_8 year^2 + \beta_9 c_i + \beta_{10} s_j - u_{ijt} + v_{ijt} \quad (3)$$

where all lower case letters represent logarithms and $v = ln(\eta_{ijt})$, $u = \ln(\varepsilon_{ijt})$.

y_{ijt} is value added, k_{ijt} is physical capital, l_{ijt} is labour supply, p_{ijt} is domestic knowledge measured by local R&D, and r_{it} represents foreign knowledge spillovers, which are assumed to be a function of the stock of R&D in the five countries that contribute most to the global stock of R&D.

We make the simplifying assumption that technology is factor-neutral, implying that output is separable in the production function and technology, so that we can separate technological change p_{it} from efficiency u_{ijt} in TFP. A quadratic time trend, $year^2$, is also included to measure technical progress not captured by local and foreign R&D.[49] Finally, a set of country fixed effects c_i and a set of sector fixed effects s_j are included to control for country and sector specific characteristics.

[49] A similar assumption is made by Henry et al. (2009).

Following Griliches and Lichtenberg (1984), knowledge is assumed to be an input in the production function. As Kneller and Stevens (2006), we assume that knowledge evolves with the local stock of R&D and with foreign knowledge spillovers, capturing technical change. To measure foreign R&D spillovers to the domestic economy, we follow Coe and Helpman (1995) and Henry et al. (2009). They use a bilateral-imports-share weighted sum of R&D capital stocks of trade partners. Using the same logic, we weight the stock of R&D of the five countries that contribute most to the total stock of R&D by the share of imported machinery and equipment from these countries. This is motivated by the evidence that most of the world's R&D is produced in a small number of R&D intensive countries and imported through R&D intensive inputs (Eaton and Kortum 2001, Caselli and Wilson 2004).

Finally, we assume that knowledge transfer is partial, depending on the degree of economic integration across countries. Barriers to knowledge transfer are captured by weighting the stock of R&D by the distance to the source.

$$R_{it} = \sum_{n=5}\left(\frac{P_{nt} * m_{int}}{D_{in}}\right)$$

where n is an index for the five top countries, P_{nt} is the stock of R&D in country n, m_{in} is the share of machinery and equipment imported by country i from country n, and D_{in} is the distance between country i to country n.

Technical inefficiency is defined by

$$u_{ijt} = \delta_{0j} + \delta_1 z_{it} + \delta_2 lowtech * z_{it} + \delta_3 h_{it} + \delta_4 lowtech * h_{it} + \delta_5 s_i + w_{ijt} \quad (4)$$

where, as before, all lower case letters represent logarithms. z_{it} is stock of patents, h_{it} is human capital, *lowtech* is a dummy variable taking value 1 when the sector is low-tech and 0 otherwise, s_i are sector fixed effects, and w_{ijt} has been defined after equation (2).

The impact of knowledge on inefficiency is captured by the stock of patents. To our knowledge, the use of stock of patents is new in the empirical literature on absorptive capacity. Kneller and Stevens (2006) use spending on R&D in the industry to measure the effect of knowledge on inefficiency. In our analysis, we prefer to use stock of patents as a measure of knowledge for two reasons. First, we believe that stock of patents is a more reliable indicator of the quality and effectiveness of knowledge production than expenditure on R&D[50]. Second, we find stock of patents to be more robust to multicollinearity problems than expenditure on R&D, given the high correlation between spending in R&D and years of schooling that we observed (=0.77) in our preliminary analysis.

We use average years of schooling in country *i* as proxy for human capital. The effect of both stock of patents and years of schooling is allowed to vary between high-tech and low-tech sectors. A number of studies investigate how the effect of R&D activities on efficiency and on productivity varies between high-tech and low-tech sectors (see Kumbhakar et al. (2011) for a literature review). Following this literature, we disentagle the effect of R&D activities, in our paper proxied by patents, on efficiency to highlight differences between high-tech and low-tech sectors. We follow the same line of reasoning for human capital, although only a few studies have specifically looked at differences between high-tech and low-tech sectors in this respect.

Finally, a set of sector fixed effects are added to control for sector specific characteristics. If the stock of knowledge and human capital

[50] We are aware that our results might be slightly biased due to the fact that certain sectors feature higher appropriability conditions of innovation than others, and that patenting might be relatively less costly for firms in developed countries than for firms in developing countries.

positively affect absorptive capacity in the high-tech sectors, we should expect 1 and 3 to have a negative sign. In the low-tech sectors, we should expect the sum of the coefficients for both the stock of patents and years of schooling to be negative (e.i. $1 + 2 < 0$ and $3 + 4 < 0$).

4.3 Data

The model is estimated for a sample of 10 European and North-American OECD countries (United Kingdom, United States, France, Germany, Italy, Belgium, Norway, Sweden, Netherlands, Denmark), 7 Asian countries (China, India, Indonesia, Japan, Philippines, Singapore,South Korea), 5 Latin American countries (Bolivia, Chile, Colombia, Mexico, Uruguay) and for twenty-two manufacturing industries over the period 1996-2005.[51] We divide the twenty-two manufacturing sectors into high-tech and low-tech sectors, following the standard OECD sector classification.[52]

While the first group of 10 OECD countries is included as a benchmark, we have chosen the other two country groups from regions that are characterized by different historical and political pre-conditions, i.e. Asia and Latin America. Whereas the countries in the first group have been among the world's leading industrialized nations for a long time, most countries in the two other groups are developing and newly industrialized economies that are still at a much lower level of economic development. Many of them share a recent history of successful economic catch-up, which makes them especially interesting for an analysis of absorptive capacity.

[51] Stock of R&D, years of schooling and number of patents are available only at the country level.

[52] See table 6 in the appendix.

Our choice of countries was limited by the availability of sectoral data. Sectoral data is not yet available for many developing countries, and has only recently been made available for most of the non-OECD countries in our sample. As of now, our sample is thus the largest possible considering issues of data availability. Furthermore, we have excluded developing countries from Africa, as data availability was very limited and technology absorption has arguably played only a marginal role in these countries until recently (Lall and Pietrobelli, 2002).

Data for valued added, gross fixed capital formation and number of employees are taken from the UNIDO ISDB (3-4 digit level). Data are comparable across years, having been deflated to 2000 prices and converted using measures of purchasing power parity (PPP) to US$. Both the GDP deflator and the PPP conversion factor are taken from the World Bank. The perpetual inventory method (PIM) is used to construct the capital stock.

$$K_{ijt+1} = K_{ijt} + I_{ijt+1} - \delta K_{ijt} \tag{5}$$

$$K_{ij0} = \frac{I_{ij0}}{g_i^K + \delta^K} \tag{6}$$

where K_{ij} is capital stock of sector j in country i, I_{ij} is capital formation/investment, δ^K is the depreciation rate set at 4% (Liao et al. 2009), and g_i^K is the average growth in the first five years of investment series.

Human capital is measured by average years of schooling in the population in country *i*, and is taken from Barro and Lee (2010)[53]. The PIM is also used to compute stock of R&D using total R&D expenditure in country *i* deflated to 2000 prices, and converted using measures of purchasing power parity (PPP) to US$.

$$P_{it+1} = P_{it} + R_{it+1} - \delta P_{it} \tag{7}$$

$$P_{i0} = \frac{R_{i0}}{g_i^R + \delta^R} \tag{8}$$

where P_i is the stock of R&D in country i, R_i is the expenditure in R&D, g_i^R is the average annual growth rate of R&D and δ^R is the rate of depreciation of R&D stock that we set at 15% (Griliches 1984).

Data on patents are obtained from OECD. We use the triadic patent families which are a set of patents filed at the European Patent Office (EPO), the United States Patent and Trademark Office (USPTO), and the Japan Patent Office (JPO), for the same invention, by the same applicant. The PIM is used to compute the stock of patents:

$$Z_{it+1} = Z_{it} + TFP_{it+1} - \delta Z_{it} \tag{9}$$

$$Z_{i0} = \frac{TFP_{i0}}{g_i^Z + \delta^Z} \tag{10}$$

[53] Ideally, it would be better to use a closer proxy for absorptive capacity, such as the number of university graduates in technical subjects. However, for most of the emerging economies in our sample, such data is not yet available, or has only very recently been made available.

where Z_{it} is the stock of patents in country i, TPF_i is the number of triadic patent families, g_i^Z is the average annual growth rate of patents, and δ^Z is the depretiation rate set at 15% (Hall and MacGarvie 2010).

Foreign R&D spillovers are computed using the stock of R&D of the United States, Japan, Germany, France and the United Kingdom, which are the countries which contributed most to the stock of total R&D over the period 1996-2005. The share of imported machinery and equipment is calculated by using data on total imports and imported machinery and equipment from UN Comtrade, deflated to 2000 prices and converted using measures of purchasing power parity (PPP) to US$.

Distance between capital cities in kilometers is taken from Gleditsch (2003). For about 50% of our observations we have a balanced panel, while for more than 63% we have 9 out of 10 years, and for almost 70% 8 out of 10 years.[54]

Table 4.1 shows the basic descriptive statistics for all the variables of our analysis.

[54] Table 7 in the Appendix summarizes the number of available sectors by country and by year.

Table 4.1: Descriptive Statistics

Total						**OECD**					
	Q1	Med.	Q2	Mean	St.Dev.		Q1	Med.	Q2	Mean	St.Dev.
y	6.57	7.98	9.2	7.8	2.06	y	7.01	8.23	9.32	8.17	1.86
k	7.18	8.85	10.3	8.68	2.19	k	8.0	9.24	10.3	9.08	1.85
l	9.43	10.8	12.2	10.7	1.98	l	9.79	11.1	12.2	10.9	1.8
p	27.6	29.2	30.3	28.8	2.08	p	28.8	29.6	30.6	29.8	1.37
r	26.6	27.3	27.8	27.2	0.7	r	27.5	27.8	27.9	27.6	0.59
z	3.4	7.22	8.83	6.38	3.42	z	7.34	8.45	9.38	8.56	1.46
h	2.07	2.23	2.38	2.17	0.31	h	2.23	2.35	2.44	2.35	0.13
Asia						**Latin America**					
	Q1	Med.	Q2	Mean	St.Dev.		Q1	Med.	Q2	Mean	St.Dev.
y	7.36	8.53	9.65	8.36	1.83	y	4.63	6.36	7.43	6.07	1.96
k	8.11	9.89	10.9	9.51	1.93	k	5.28	6.5	7.66	6.46	1.87
l	10.4	11.7	12.7	11.5	1.82	l	7.82	9.23	10.3	9.08	1.73
p	27.5	29.5	30.2	29.0	1.94	p	24.5	26.6	26.9	26.2	1.39
r	26.3	26.6	27.3	26.7	0.54	r	26.5	26.7	27.0	26.7	0.32
z	3.59	5.43	8.19	5.86	3.39	z	0.32	1.73	2.41	1.69	1.2
h	1.63	2.08	2.36	1.97	0.43	h	1.96	2.02	2.08	2.03	0.11

4.4 Results

4.4.1 Frontier Estimates

We report the results of our frontier estimation in Tables 4.2 and 4.3, with Table 4.2 showing frontier estimates, and Table 4.3 output elasticities. Estimated elasticities are within the range of what is found elsewhere in the literature, although we find slightly higher values for the elasticity of value added with respect to labour than studies using data for earlier periods (Kneller and Stevens 2006, Liao et al. 2009). For the full sample, the elasticity of value added with respect to physical capital is 0.201, and that with respect to labour 0.802. While we find evidence for mildly increasing returns to scale for physical capital and labour concerning OECD countries and Latin America (1.025 and 1.081), returns to scale are slightly decreasing for Asia (0.938).

The estimated effect of the stock of local R&D on output is strongly positive and significant at the 1% level for OECD countries (0.233), but only weakly positive and not significant for Asia (0.038). For Latin America, stock of R&D has a negative effect on output (-0.426), significant at the 10% level.

Our results for OECD countries are similar to those found by earlier studies. Kneller and Stevens (2006) obtain slightly lower coefficients for a group of twelve OECD countries during the period 1973-1990 (0.03-0.09, pp.10). Coe and Helpman (1995) find that for the seven most advanced OECD countries between 1971 and 1990, the estimated elasticity of TFP with respect to domestic R&D varies between 0.22 and 0.23, while for the remaining group of fifteen less advanced OECD countries, the elasticity lies between 0.6 and 1 (pp. 869). Kneller (2005) finds much lower coefficients for a group of twelve OECD countries over the same period (0.02-0.04, pp. 10), while Griffith et al. (2004) obtain larger coefficients for the same panel of OECD countries (0.4-

0.6, pp. 889). However, they use TFP growth instead of TFP as dependent variable, and assess the rate of return to R&D.

Table 4.2: Frontier Estimates – Regression Results

	Estimation of equation 2 (page 32) , dependent variable: value added			
	Total	**OECD**	**Asia**	**Latin America**
k (capital)	**0.354*** **	**0.375*** **	**0.360*** **	**-0.142***
	(0.024)	**(0.023)**	**(0.079)**	**(0.085)**
l (labour)	**0.705***	**0.503*** **	**0.962*** **	**1.525*** **
	(0.035)	**(0.029)**	**(0.112)**	**(0.129)**
k^2	0.003	**0.048*** **	0.003	**0.045*** **
	(0.003)	**(0.005)**	(0.006)	**(0.009)**
l^2	**0.013*** **	**0.063*** **	0.0002	**-0.030*** **
	(0.003)	**(0.003)**	(0.009)	**(0.012)**
lk	**-0.020*** **	**-0.105*** **	-0.021	-0.022
	(0.005)	**(0.007)**	(0.012)	(0.018)
p (R&D stock)	-0.068	**0.233*** **	0.038	**-0.426***
	(0.045)	**(0.064)**	(0.076)	**(0.070)**
r (R&D expd.)	0.026	0.045	0.030	0.012
	(0.051)	(0.058)	(0.093)	(0.073)
$year^2$	**0.0006*** **	0.0001	**0.0009***	-0.0002
	(0.0002)	(0.0002)	**(0.0005)**	(0.0005)
const	-1.150	**-9.568*** **	**-6.3*** **	**4.965*** **
	(0.990)	**(1.122)**	**(1.010)**	**(1.034)**
Log-likelihood	-858.355	694.804	-260.021	-106.590
N	3904	1968	1148	788

The level of significance is shown with the following notation: *** 1%, ** 5%, and * 10%; significant results marked bold.

Table 4.3: Elasticity of output with respect to labour and capital (at the sample mean)

	Labour	Physical Capital
Total	0.802	0.201
OECD	0.924	0.101
Asia	0.763	0.175
Latin America	0.845	0.236

We thus find that local stock of R&D directly affects production in our sample of OECD countries. For Asia, the weaker and not significant effect suggests that local R&D plays mainly a role in facilitating the absorption of foreign technology, instead of affecting output directly.

For Latin America, although a negative effect of the stock of local R&D on output seems to be counter-intuitive at first sight, our results confirm findings by earlier studies. In a study of 16 Latin American countries between 1996 and 2006, Castillo et al. (2012) find a negative contribution of R&D expenditure to productivity, which they attribute to recent changes in the pattern of specialization in the region in favour of industries with low-value added content that rely less and less on domestic R&D. Cimoli and Katz (2003) make the same argument, outlining that "dramatic changes in the sources of technical change" have occurred in Latin America in the 1990s, with "a rapidly increasing share of external sources emerging at the expense of domestic ones"

(Cimoli and Katz (2003), pp. 390). While import substitution policies until the 1980s had focused on the building of domestic knowledge creation, they maintain that today those industries still relying on domestic R&D are inefficient and lagging behind. Efficient industries are clustered within the natural resource sectors or are performing assembly operations of imported parts ('maquiladoras'), relying almost exclusively on foreign R&D and cheap labour. It thus seems that our results for Latin America reflect recent structural changes on the continent, and capture the decreasing importance of local R&D.

The estimated effect of foreign R&D spillovers on output is slightly lower than what is found elsewhere in the literature (for example Coe and Helpman (1995) find an elasticity of TFP with respect to foreign R&D spillovers of 0.06-0.092, and Kneller and Stevens (2006) an elasticity of output with respect to foreign R&D of 0.084-0.091). However, for our sample effects are not significant. This could mean that foreign R&D spillovers through machinery and equipment imports have only a weak or indirect effect on domestic production. As we are only capturing foreign knowledge embodied in R&D intensive inputs, we leave out other potential channels through which foreign R&D might affect domestic output directly, such as FDI or licensing.

4.4.2 Efficiency Levels

Table 4.4 presents efficiency scores for low-tech and high-tech sectors in each country group. In general, efficiency scores slightly increase over the time span covered in our study, with the exception of Latin America, where efficiency in high-tech sectors experiences a sharp drop after 1999. A temporary drop in high-tech efficiency, albeit less pronounced, is also noticeable for Asia and OECD countries after 1999. Possibly, the Asian and Russian financial crises and the burst of the dot-com bubble are responsible for this drop in high-tech efficiency around the turn of the millennium, with the effect in Latin America being amplified by the aftermath of recent structural adjustment programs that made the region more vulnerable to economic shocks.

Table 4.4: Mean efficiency by country, low- and high-tech sectors

	Total		OECD		Asia		Latin America	
Year	l.tech	h.tech	l.tech	h.tech	l.tech	h.tech	l.tech	h.tech
1996	0.731	0.764	0.793	0.775	0.767	0.837	0.768	0.810
1997	0.736	0.770	0.802	0.792	0.764	0.835	0.763	0.814
1998	0.737	0.771	0.796	0.803	0.770	0.823	0.773	0.801
1999	0.745	0.785	0.798	0.806	0.779	0.853	0.764	0.786
2000	0.747	0.781	0.813	0.807	0.763	0.839	0.762	0.746
2001	0.727	0.748	0.810	0.765	0.743	0.831	0.732	0.693
2002	0.727	0.744	0.804	0.763	0.756	0.834	0.739	0.671
2003	0.734	0.754	0.810	0.776	0.761	0.843	0.748	0.674
2004	0.746	0.769	0.825	0.795	0.764	0.846	0.814	0.670
2005	0.742	0.781	0.822	0.794	0.763	0.854	0.786	0.762

For the full sample, mean efficiency in low-tech sectors is slightly lower than mean efficiency in high-tech sectors (Figure 4.2). However, regional differences are quite pronounced. While from 1996 to 2000 mean efficiency for low-tech and high-tech sectors is almost the same in OECD countries, in 2001 efficiency drops notably in high-tech sectors, which then remain consistently less efficient than low-tech sectors. In Latin America, high-tech sectors are more efficient than low-tech sectors until 2000, and then experience a similar, albeit much stronger drop. Finally, in Asia high-tech sectors are consistently more efficient than low-tech sectors.

Figure 4.1: Mean efficiency by country group

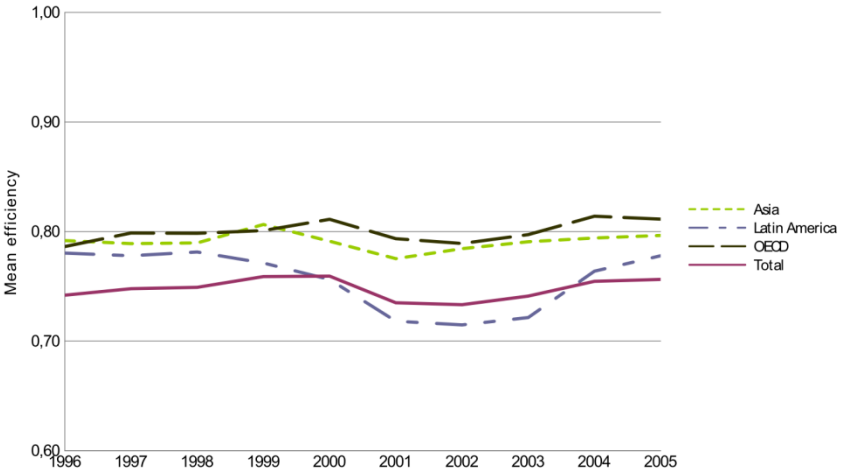
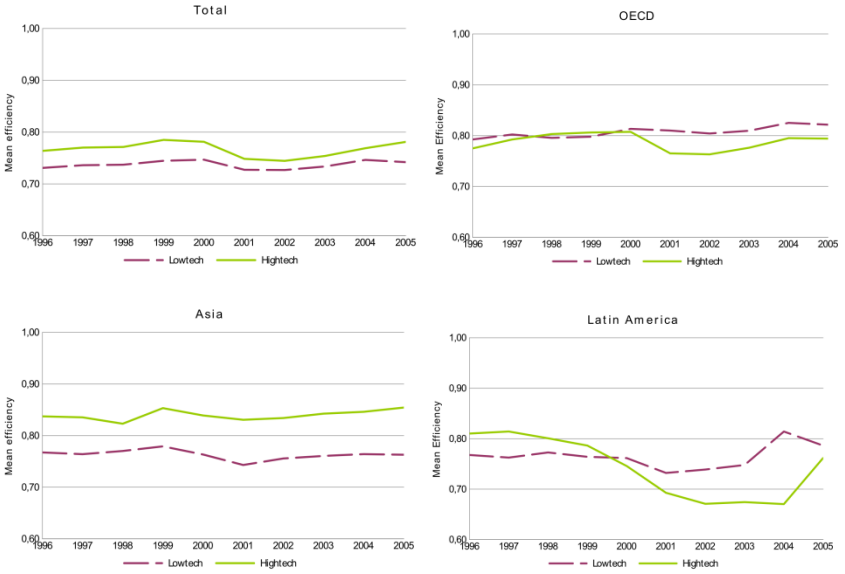


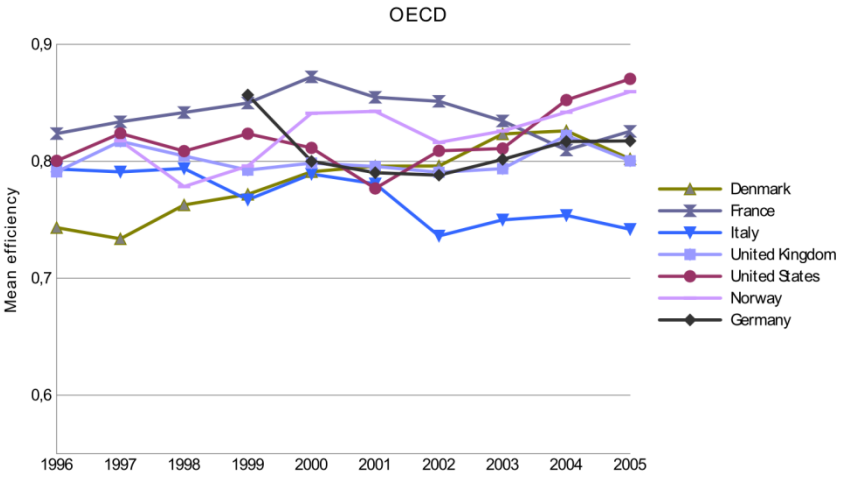
Figure 4.2: Mean efficiency by country group, low-tech and high-tech sectors



Figures 4.3, 4.4 and 4.5 look on the performance of individual countries within our three regional groups. For OECD countries, a marked drop in high-tech efficiency for France, the Netherlands, Sweden and Italy is notable from 2000 onwards, with Italy remaining stuck at a level of high-tech efficiency that is the lowest of all 22 countries in our sample. On the other hand, the United States, Denmark and Norway significantly improve their efficiency during the second half of the period observed, while efficiency levels for the UK, Germany and Belgium remain roughly the same from 1996 to 2005 (see figure 4.3).

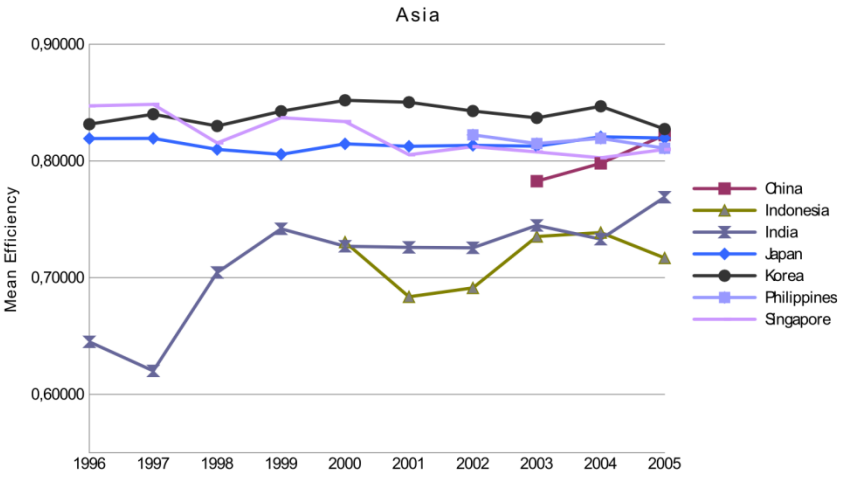
What we capture here is probably the divergence in productivity between the US and some Scandinavian countries on the one hand, and most European OECD countries on the other hand, which became notable since the late 1990s and is most often attributed to the better exploitation of ICT-induced productivity gains by the US (Van Ark B., 2003). Less flexible and more regulated labour markets in Europe might also play a role in this respect (Bassanini et al. 2009).

Figure 4.3: Mean efficiency – OECD



In Asia, a group of high performers includes South Korea, Japan, Singapore and the Philippines, while Indonesia remains at a lower level of technical efficiency. India and China lie in between, and seem to be fast catching up to the group of high-performers. India significantly increased its efficiency between 1997 and 2005, especially in high-tech sectors, where it has become the most efficient of all 22 countries in our sample by 2005. However, despite a 0.1 increase between 1997 and 2005, low-tech sectors are still very inefficient in the country, so that, with the exception of Mexico, they remain the most inefficient of all countries in our sample in 2005 (figure 4.4).

Figure 4.4: Mean efficiency – Asia

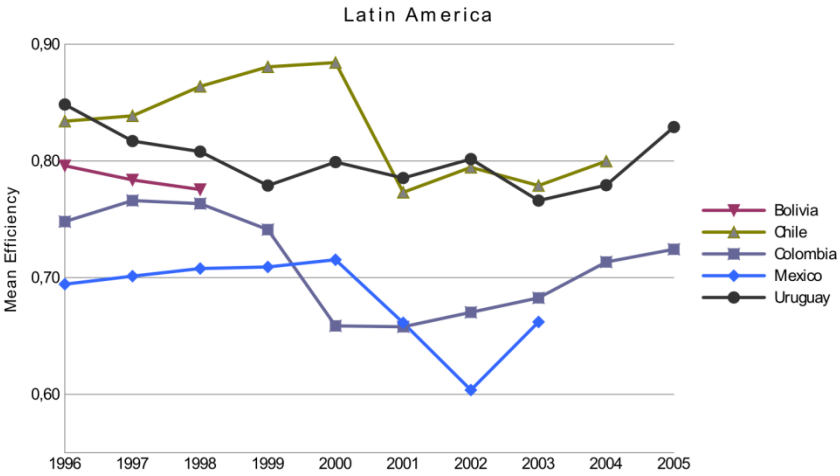


With respect to the debate about the relative importance of technical efficiency improvements to growth in India (Bhaumik and Kumbhakar 2010, Kim and Saravanakumar 2012), our paper thus finds evidence for an increase in technical efficiency, especially in high-tech sectors. The marked divide that we find between efficiency in low- and high-tech sectors also confirms conclusions by earlier studies (D'Costa 2003), which suggest that the Indian economy is driven forward by some efficient high-tech industries, especially in the ICT sector, while low-tech industries are still lagging behind. With respect to China, even though we only have data for 2003-2005, it looks as if China has successfully managed, within a short time-span, to leave the group of low performers and join the group of high-efficiency countries.

For Latin America, a sharp drop in efficiency for high-tech sectors in Chile, Mexico, Colombia and Uruguay is notable between 1999 and 2001, followed by a slight recovery afterwards. After 2000, high-tech sectors are consistently much less efficient in Latin America than in OECD countries and Asia (figure 4.5). This drop in efficiency might be a consequence of the series of financial crises that hit the continent around the year 2000. Colombia was hit by a crisis in 1998, Brazil in 1999, and Argentina, Ecuador and Uruguay in 2001, and most countries suffered from a recession for some of the years between 1999 and 2003 (Rojas-Suarez, 2010). For Colombia and Uruguay, the year of their respective financial crisis coincides with the drop in efficiency we notice (Figure 4.9 in the Appendix). Although Chile and Mexico were not directly affected, their drop in efficiency might be related to close links with the crisis countries. For all four countries, the drop in efficiency is closely related to negative rates of GDP growth. Chile experienced negative GDP growth in 1999, preceding the 0.23 drop in high-tech efficiency we notice for 2000-2001 (Figure 4.9). Mexico had a short recession in 2001 and low GDP growth rates for 2002 and 2003, corresponding with a 0.15 drop in high-tech efficiency for 2000-2002 (Figure 4.9). In Uruguay, GDP per capita decreased in four consecutive years between 1999 and 2002, and high-tech efficiency by 0.13 points between 2001 and 2004. Finally, Colombia's GDP decreased by -4.2% in 1999, and high-tech efficiency by 0.22 points from 1999 to 2000. The fact

that efficiency in high-tech sectors decreased notably during this period of economic turbulence, while low-tech sectors remained remarkably stable, could indicate that high-tech sectors in Latin America are more internationally integrated but also more vulnerable to economic perturbations than low-tech sectors.

Figure 4.5: Mean efficiency – Latin America



4.4.3 Determinants of Technical Efficiency

Stock of Patents

Table 4.5 reports the results of our efficiency estimation. We find that an increase in the stock of patents has a negative and significant effect on technical inefficiency in high-tech sectors across all country groups. A 1% increase in the stock of patents decreases inefficiency in high-tech sectors in OECD countries by 0.219%, by 0.14% in Asia and by 0.119% in Latin America.

Interestingly, this effect changes once we look on low-tech industries. Here, we consistently find low for OECD countries, with a 1% increase in the stock of patents leading to a 0.013% increase in inefficiency, in Asia inefficiency increases by 0.177%, and in Latin America by 0.351% in low-tech sectors for a 1% increase in the stock of patents.

Our findings differ from those of Kneller and Stevens (2006), who find that R&D "has only an insignificant effect on inefficiency" (Kneller and Stevens 2006, pp. 19). Using stock of patents instead of R&D expenditure as a proxy for the effectiveness of domestic R&D in a stochastic frontier framework reveals a significant effect of domestic R&D on efficiency, which however fundamentally differs between high-tech and low-tech sectors.

Large parts of the more general literature on the effects of R&D on productivity also find such a difference between high-tech and low-tech sectors (see Kumbhakar et al. (2011) for a literature review). While domestic R&D has generally a strong and positive impact on productivity in high-tech sectors, the impact is low or not significant for low-tech sectors. For instance, using a dataset of top European R&D investors over the period 2000–2005, Kumbhakar et al. (2011) find that R&D in low-tech sectors "has a minor effect in explaining productivity", whereas in high-tech sectors the effect of R&D on productivity is found to be strong and positive. By analyzing a sample of 156 large Taiwanese firms for the period 1994-2000, Tsai and Wang (2004) find a positive but very low effect of R&D on productivity for

low-tech sectors, whereas the effect was positive and strong for high-tech sectors.

Our findings are coherent with previous studies in that we also find a substantial difference between high-tech and low-tech sectors. However, the difference we find is even larger, since for our sample an increase in the stock of domestic knowledge has a positive effect on inefficiency for low-tech sectors.

Table 4.5: Regression Results – Efficiency Determinants

	Estimation of equation 4 (page 33), dependent variable: technical inefficiency of production			
	Total	**OECD**	**Asia**	**Latin America**
z (stock of patents)	**-0.187*** **	**-0.219*** **	**-0.140*** **	**-0.119***
	(0.013)	**(0.021)**	**(0.019)**	**(0.071)**
low-tech*z	**0.361*** **	**0.232*** **	**0.317*** **	**0.470*** **
	(0.020)	**(0.021)**	**(0.020)**	**(0.074)**
h (human capital)	**0.660*** **	**-0.843*** **	**-1.876*** **	-0.363
	(0.136)	**(0.168)**	**(0.198)**	(0.437)
low-tech*h	**-2.992*** **	**-0.548*** **	**-0.685*** **	**-3.705*** **
	(0.157)	**(0.174)**	**(0.208)**	**(0.3402)**
const.	**0.838*** **	**1.722*** **	**1.654*** **	4.066
	(0.211)	**(0.354)**	**(0.413)**	(0.935)
sigma squared	**0.658*** **	**0.291*** **	**0.558*** **	**0.377*** **
	(0.022)	**(0.007)**	**(0.029)**	**(0.022)**
gamma	**0.943*** **	**0.974*** **	**0.912*** **	**0.911*** **
	(0.004)	**(0.003)**	**(0.009)**	**(0.012)**
N	3904	1968	1148	788

The level of significance is shown with the following notation: *** 1%, ** 5%, and * 10%; significant results marked bold.

This effect is much stronger in developing countries than in our group of OECD countries. A possible explanation might be that we use patents as a proxy for effectiveness of R&D. As patenting activity is higher in high-tech sectors (Brouwer and Kleinknecht 1999, Lotti and Schivardi 2006), and resources for R&D are scarce, a crowding-out effect might occur that diverts resources from R&D in low-tech to R&D in high-tech sectors, due to expected greater returns to R&D in high-tech sectors. As we have only aggregate data for patents, it is possible that we capture this effect in our regression. An increase in patenting activity in an environment where resources for R&D are relatively scarce could thus lead to the negative effect on efficiency in low-tech sectors that we find. If this interpretation comes close to what is actually happening, it would suggest that the crowding-out effect is stronger for Latin America than for Asia.

Human Capital

The second determinant of technical efficiency we examine is human capital, measured by years of schooling (Barro and Lee 2010). We find that an increase in years of schooling has almost always a strong and significant negative effect on technical inefficiency, with the effect being stronger for low-tech sectors. For high-tech sectors, increasing years of schooling by 1% decreases inefficiency by 0.843% in OECD countries, by 1.876% in Asia, and by 0.363% in Latin America, although results for Latin America are not significant. In low-tech sectors, a 1% increase in years of schooling decreases inefficiency by 1.39% in OECD countries, by 2.56% in Asia and by 4.07% in Latin America.

Our results are in line with those of previous studies. For a group of twelve OECD countries, Kneller and Stevens (2006) find that a 1% increase in human capital decreases inefficiency by 1.86%. Their coefficient is slightly higher than ours. As they look on an earlier period (1973-1990), this could be a sign for marginal decreasing returns of human capital over time in OECD countries. To our knowledge, there are no previous studies that use a stochastic frontier framework and

specifically look at the effect of human capital on inefficiency in Asia and Latin America. However, looking at a group of 57 developing countries for the period 1960-2000, Mastromarco (2008) finds that increasing human capital by 1% decreases inefficiency by 2.33%.

We find that an increase in human capital reduces technical inefficiency more in low-tech than in high-tech sectors. This could mean that the type of human capital captured by the years of schooling data provided by Barro and Lee (2010) is more relevant in low-tech than in high-tech sectors. While an additional year of schooling has a strong impact on efficiency in low-tech activities, efficiency improvements in high-tech sectors are mainly induced by increases in "highly qualified" human capital (e.g. education at a post-graduate and doctoral level, specialist qualifications, etc.), which are not captured by Barro and Lee's data on years of schooling.

Comparing OECD countries and Asia to Latin America reveals further interesting results. Whereas in the former the effect of schooling on low-tech sectors is only slightly higher than the effect on high-tech sectors, for Latin America the effect of schooling on efficiency in low-tech sectors is exceptionally strong, whereas the effect on high-tech sectors is relatively small and insignificant. This suggests that the quality of human capital in low-tech sectors is still very low in Latin America.

4.5 Conclusion

Using a stochastic frontier framework and data for 22 manufacturing sectors, we found notable differences in technical efficiency between a group of 10 OECD countries, 7 Asian countries and 5 Latin American countries. As the efficiency of a country's manufacturing industries is a strong determinant of their capacity to absorb technology produced abroad, these differences are important to understand differences in growth and productivity, especially for developing countries which depend to a large extend on foreign technology.

We examine the effect of two potential determinants of a country's absorptive capacity: human capital measured by years of schooling, and the effectiveness of domestic R&D, proxied by the stock of patents. We find that years of schooling always have a strongly positive effect on efficiency, especially in low-tech sectors and for developing countries. The stock of patents positively affects efficiency in high-tech sectors, but has a consistently negative effect on efficiency in low-tech sectors, especially for Asia and Latin America.

To our knowledge, this is the first study using a stochastic frontier approach and sectoral data not only for OECD countries, but also for two groups of emerging economies. Using sectoral data permits us to disaggregate the efficiency effect of schooling and stock of patents between low-tech and high-tech sectors. However, as in many developing countries sectoral data has only been made available recently, and is not yet available to a sufficient extend for human capital, stock of R&D and patents, there is a lot of scope for future work once better data becomes available.

4.6 References

[1] Abramovitz M. (1986), Catching Up, Forging Ahead, and Falling Behind, *The Journal of Economic History*, 46(2), 385-406

[2] Acemoglu D., Aghion P., Zilibotti F. (2006), Distance to Frontier, Selection, and Economic Growth, *Journal of the European Economic Association*, 4(1), 37-74

[3] Aghion P., Howitt P. (2005), Growth With Quality-Improving Innovations: an Integrated Framework, in Aghion P., Durlauf S. (eds.), *Handbook of Economic Growth,* 1(1), 68-97

[4] Amsden A. (1989), Asia's Next Giant: South Korea and Late Industrialization, *Oxford University Press*, Oxford

[5] Barro R., Lee J. (2010), A New Data Set of Educational Attainment in the World, 1950-2010, *NBER Working Paper No. 15902*

[6] Bassanini A., Nunziata L., Venn D. (2009), Job Protection Legislation and Productivity Growth in OECD Countries, *Economic Policy*, 24(58), 349-402

[7] Battese G., Coelli T. (1995), A Model for Technical Efficiency Effects in a Stochastic Frontier Production Function For Panel Data, *Empirical Economics*, 20(2), 325-332

[8] Benhabib J., Spiegel M. (1994), The Role of Human Capital in Economic Development: Evidence from Aggregate Cross-Country Data, *Journal of Monetary Economics*, 34(2), 143-173

[9] Benhabib J., Spiegel M. (2005), Human Capital and Technology Diffusion, in Aghion P., Durlauf S. (eds.), *Handbook of Economic Growth*, 1(1), 935-966

[10] Bhaumik S., Kumbhakar S. (2010), Is the Post-Reform Growth of the Indian Manufacturing Sector Efficiency Driven? Empirical Evidence from Plant-Level Data, *Journal of Asian Economics*, 21(2), 219-232

[11] Breznitz D., Murphree M. (2011), Run of the Red Queen: Government, Innovation, Globalization, and Economic Growth in China, *Yale University Press,* New Haven

[12] Brouwera, E., Kleinknecht, A. (1999), Innovative Output, and a Firm's Propensity to Patent: An Exploration of CIS Micro Data, *Research Policy*, 28(6), 615–624

[13] Caselli F., Wilson D. (2004), Importing Technology, *Journal of Monetary Economics*, 51, 1-32

[14] Castillo L., Salem D., Guasch J. (2012), Innovative and Absorptive Capacity of International Knowledge, *Policy Research Working Paper No. 5931*, The World Bank, Washington

[15] Cimoli M., Katz J. (2003), Structural Reforms, Technological Gaps and Economic Development: a Latin American Perspective, *Industrial and Corporate Change*, 12(2), 387-411

[16] Coe D., Helpman E. (1995), International R&D Spillovers, *European Economic Review*, 39(5), 859-887

[17] Cohen W., Levinthal D. (1989), Innovation and Learning: The Two Faces of R&D, *Economic Journal*, 99(397), 569-596

[18] D'Costa A. (2003), Uneven and Combined Development: Understanding India's Software Exports, *World Development*, 31(1), 211-226

[19] Eaton J., Kortum S. (2001), Trade in Capital Goods, *European Economic Review*, 45, 1195-1235

[20] Fagerberg J. (1994), Technology and International Differences in Growth Rates, *Journal of Economic Literature*, 32(3), 1147-1175

[21] Gerschenkron A. (1962), Economic Backwardness in Historical Perspective: A Book of Essays, *Harvard University Press*, Cambridge, MA

[22] Gleditsch, K. (2003), Distance between Capital Cities Data, version 4 June 2003, available at http://privatewww.essex.ac.uk/~ksg/data-5.html, accessed on November 15th, 2011

[23] Griffith R., Redding S., Van Reenen (2003), R&D and Absorptive Capacity: Theory and Empirical Evidence, *Scandinavian Journal of Economics*, 105(1), 99-118

[24] Griffith R., Redding S., Van Reenen J. (2004), Mapping the Two Faces of R&D: Productivity Growth in a Panel of OECD Industries, *Review of Economics and Statistics*, 86(4), 883-895

[25] Griliches, Z. (1984), Market Value, R&D, and Patents, NBER Chapters, in Griliches Z. (ed.), R&D, Patents and Productivity, NBER and Chicago University Press, Chicago

[26] Griliches Z., Lichtenberg F. (1984), R&D and Productivity Growth at the Industry Level: is There Still a Relationship?, in Griliches Z. (ed.), R&D, Patents and Productivity, NBER and Chicago University Press, Chicago

[27] Hall B., MacGarvie M. (2010), The Private Value of Software Patents, *Research Policy*, 39(7), 994-1009

[28] Henry M., Kneller R., Milner C. (2009), Trade, Technology Transfer and National Efficiency in Developing Countries, *European Economic Review*, 53(2), 237-254

[29] Kim S., Saravanakumar M. (2012), Economic Reform and Total Factor Productivity Growth in Indian Manufacturing Industries, *Review of Development Economics*, 16(1), 152-166

[30] Kneller R. (2005), Frontier Technology, Absorptive Capacity and Distance, *Oxford Bulletin of Economics and Statistics*, 67(1), 1-24

[31] Kneller R., Stevens P. (2003), The Specification of the Aggregate Production Function in the Presence of Inefficiency, *Economic Letters*, 81(2), 223-226

[32] Kneller R., Stevens P. (2006), Frontier Technology and Absorptive Capacity: Evidence from OECD Manufacturing Industries, *Oxford Bulletin of Economics and Statistics*, 68(1), 1-21

[33] Koop G., Osiewalski J., Steel M. (1999), The Components of Output Growth: A Stochastic Frontier Analysis, *Oxford Bulletin of Economics and Statistics*, 61(4), 455-487

[34] Koop G., Osiewalski J., Steel M. (2000), Modelling the Sources of Output Growth in a Panel of Countries, *Journal of Business and Economic Studies*, 18(3), 284-289

[35] Kumbhakar S., Ortega-Argiles R., Potters L., Vivarelli M., Voigt P. (2011), Corporate R&D and Firm Efficiency: Evidence from Europe's Top R&D Investors, *Journal of Productivity Analysis,* forthcoming

[36] Lall S., Pietrobelli C. (2002), Failing to Compete: Technology Development and Technology Systems in Africa, *Edward Elgar*, Cheltenham

[37] Liao H., Liu X., Holmes M., Weyman-Jones T. (2009), The Impact of Foreign R&D on Total Factor Productivity in the East Asian Manufacturing Industry, *The Manchester School*, 77(2), 244-270

[38] Lotti, F., Schivardi, F. (2005), Cross Country Differences in Patent Propensity: A Firm-Level Investigation, Giornale degli Economisti e Annali di Economia, 64 (4), 469-502

[39] Madden G., Savage S., Bloxham P. (2001), Asian and OECD International R&D Spillovers, *Applied Economic Letters*, 8(7), 431-435

[40] Madsen J., Islam R., Ang J. (2010), Catching Up to the Technology Frontier: The Dichotomy Between Innovation and Imitation, *Canadian Journal of Economics*, 43(4), 1389-1411

[41] Mastromarco C. (2008), Foreign Capital and Efficiency in Developing Countries, *Bulletin of Economic Research*, 60(4), 351-374

[42] Miller S., Upadhyay M. (2000), The Effects of Openess, Trade Orientation, and Human Capital on Total Factor Productivity, *Journal of Development Economics,* 63(2), 399-423

[43] Nelson R., Phelps E. (1966), Investment in Humans, Technological Diffusion, and Economic Growth, *American Economic Review*, 56(1/2), 69-75

[44] Okabe M. (2002), International R&D Spillovers and Trade Expansion: Evidence from East Asian Economies, *Asian Economic Bulletin*, 19(2), 141-154

[45] Prescott E. (1998), Needed: A Theory of Total Factor Productivity, *International Economic Review*, 39(3), 525-551

[46] Rojas-Suarez L. (2010), The International Financial Crisis: Eight Lessons for and from Latin America, *Working Paper No. 202*, Center for Global Development, Washington

[47] Senhadji A. (2000), Sources of Economic Growth: An Extensive Growth Accounting Exercise, *IMF Staff Papers*, 47(1), 129-158

[48] Tsai K., Wang J. (2004), R&D Productivity and the Spillover Effects of High-Tech Industry on the Traditional Manufacturing Sector: The Case of Taiwan, *World Economy*, 27(10), 1555-1570

[49] Van Ark B., Inklaar R., McGuckin R. (2003), 'Changing Gear': Productivity, ICT and Service Industries in Europe and the United States, in Christensen J., Maskell P. (eds.), *The Industrial Dynamics of the New Digital Economy*, Edward Elgar, Cheltenham

[50] Verspagen B. (1991), A New Empirical Approach to Catching Up or Falling Behind, *Structural Change and Economic Dynamics*, 2(2), 359-380

[51] Wade R. (1990), Governing the Market: Economic Theory and the Role of Government in East Asian Industrialization, *Princeton University Press*, Princeton

[52] Wang Y. (2007), Trade, Human Capital, and Technology Spillovers: An Industry-Level Analysis, *Review of International Economics*, 15(2), 269-283

4.7 Appendix

Table 4.6: Sector classifications (ISIC Rev. 3)

15 Food and beverages	low-tech
16 Tobacco products	low-tech
17 Textiles	low-tech
18 Wearing apparel	low-tech
19 Leather, leather products and footwear	low-tech
20 Wood products (excl. furniture)	low-tech
21 Paper and paper products	low-tech
22 Printing and publishing	low-tech
23 Coke, refined petroleum products, nuclear fuel	low-tech
24 Chemicals and chemical products	high-tech
25 Rubber and plastics products	low-tech
26 Non-metallic mineral products	low-tech
27 Basic metals	low-tech
28 Fabricated metal products	low-tech
29 Machinery and equipment n.e.c.	high-tech
30 Office, accounting and computing machinery	high-tech
31 Electrical machinery and apparatus	high-tech
32 Radio, television and communication equipment	high-tech
33 Medical, precision and optical instruments	high-tech
34 Motor vehicles, trailers, semi-trailers	high-tech
35 Other transport equipment	high-tech
36 Furniture, manufacturing n.e.c.	low-tech

Table 4.7: Number of available sectors by country and year

Year	'96	'97	'98	'99	'00	'01	'02	'03	'04	'05	Total
Belgium				22	22	22	22	22	22	22	154
Bolivia	18	18	18								54
Chile	18	18	18	16	16	19	19	19	19		162
China								22	22	22	66
Columbia	18	18	18	18	21	20	20	20	20	20	193
Germany				18	22	22	22	22	22	22	150
Denmark	22	22	22	22	20	20	20	19	19	19	205
France	21	21	21	21	21	21	21	21	21	21	210
Indonesia					22	22	22	22	22	22	132
India	18	18	22	22	22	22	22	22	22	22	212
Italy	22	22	22	22	22	22	22	21	21	21	217
Japan	22	22	22	22	22	22	22	22	22	22	220
S. Korea	22	22	22	22	22	22	22	22	22	22	220
Mexico	22	22	22	22	22	22	22	21			175
Netherlands	22	22	22	22	22	21	21	21	21	21	215
Norway		21	22	22	21	21	21	21	22	21	192
Philippines							22	22	22	22	88
Sweden		21	21	21	21	21	21	21	21	21	189
Singapore	21	21	21	21	21	21	21	21	21	21	210
United Kingdom	22	22	22	22	22	22	22	22	22	22	220
United States	18	22	22	22	22	22	22	22	22	22	216
Uruguay	18	22	21	21	21	21	21	21	21	21	204
Total	304	350	358	378	404	405	427	446	426	406	3904

Figure 4.6: Efficiency – Descriptive Statistics

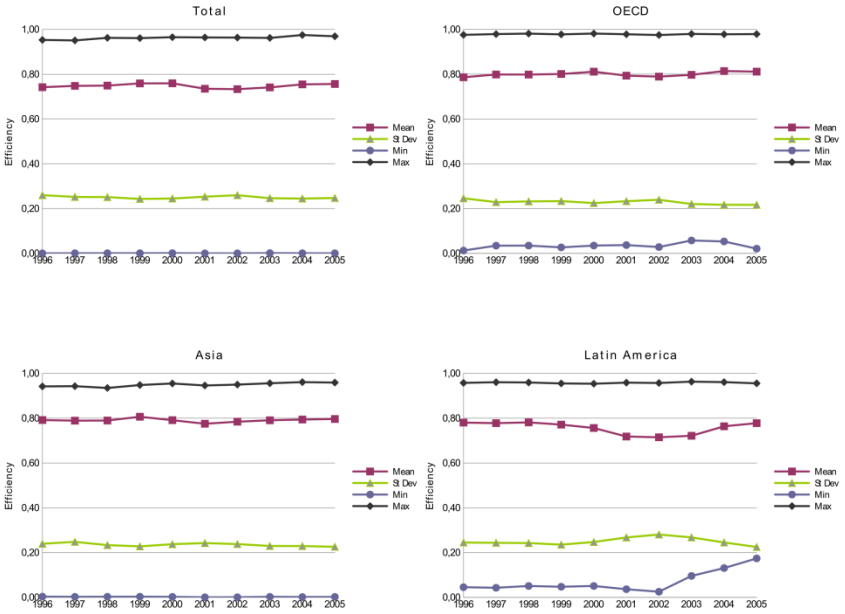


Figure 4.7: Mean efficiency by country – OECD

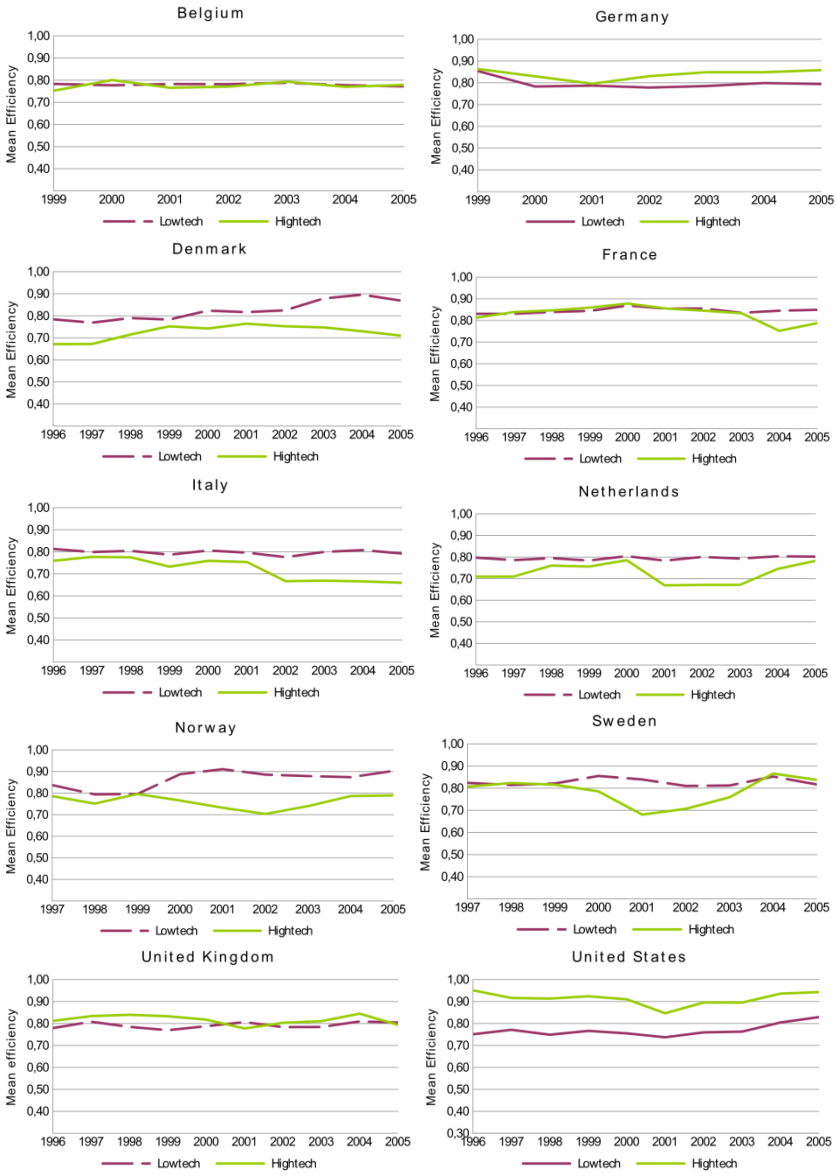


Figure 4.8: Mean efficiency by country – Asia

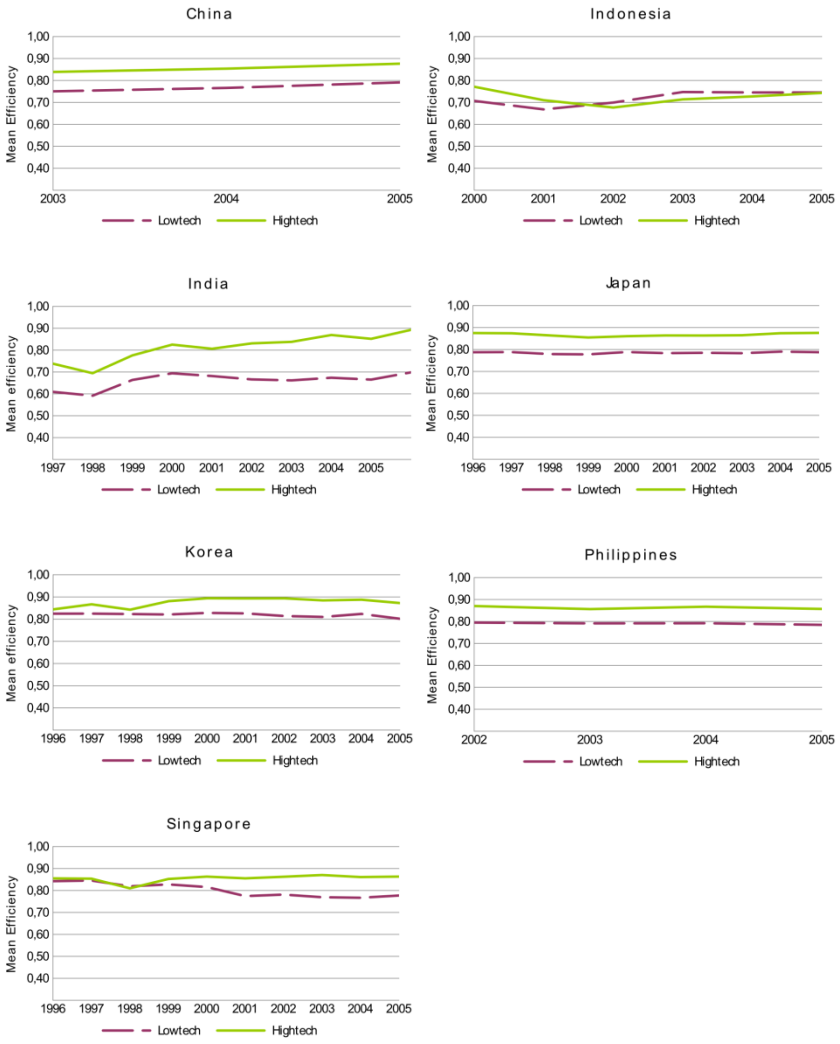


Figure 4.9: Mean efficiency by country – Latin America